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Advancing the food-energy-water nexus: Closing nutrient loops in arid river corridors

Jacob Mortensen

Jacob G. Mortensen
Candidate

Department of Civil Engineering
Department

This thesis is approved, and it is acceptable in quality and form for publication:

Approved by the Thesis Committee:

Dr. Ricardo González-Pinzón, Chairperson

Dr. David Van Horn

Dr. Andrew Schuler

ADVANCING THE FOOD-ENERGY-WATER NEXUS:
CLOSING NUTRIENT LOOPS IN ARID RIVER CORRIDORS

by

JACOB G. MORTENSEN

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CLOSING NUTRIENT LOOPS IN ARID RIVER CORRIDORS

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Jacob G. Mortensen

B.S., Civil Engineering, George Washington University, 2014

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ABSTRACT

Closing nutrient loops in terrestrial and aquatic ecosystems is integral to achieve resource security in the food-energy-water (FEW) nexus. Multiyear (2005-08), monthly samples of instream dissolved inorganic nutrient concentrations (NH_4-N, NO_3-N, soluble reactive phosphorus-SRP) along a ~300-km of the Rio Grande, NM, USA were used to investigate how the net source/sink behavior of wastewater and irrigated agriculture can be holistically managed to close nutrient loops. Wastewater on average contributed over 90% of the instream dissolved inorganic nutrients (101 kg/day NH_4-N, 1097 kg/day NO_3-N, 656 kg/day SRP). During growing seasons, the irrigation network downstream of wastewater outfalls retained on average 37% of NO_3-N and 45% of SRP inputs, with maximum retention exceeding 60% and 80% of NO_3-N and SRP inputs, respectively. Accurate quantification of NH_4-N retention was hindered by low loading and high variability. This synoptic analysis is used to identify tradeoffs associated with wastewater reuse for agriculture within the scope of the FEW nexus and propose strategies for closing nutrient loops in arid-land rivers.

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Introduction

Projected rises in human population (over 9 billion by 2050) and standards of living have accentuated the importance of the interconnections among food, energy, and water (FEW) resources and the need for holistic approaches (the FEW nexus) to promote their production, distribution, and consumption.[1–3] Accordingly, there is an urgent need to identify and quantify synergies and tradeoffs pertaining to the FEW nexus that support strategies to sustain human populations while minimizing natural ecosystem degradation.[4,5] This is especially true for arid-land regions (i.e., arid, semi-arid, and dry sub-humid), which hold over one third of the global population, nearly half of the world's livestock and cultivated land, and are facing multiple external pressures (e.g., rapid population growth, food insecurity, and climate change) that stress FEW resources.[6–8] While the FEW nexus has recently emerged as a conceptual approach to address global resource challenges, achieving resource security requires research and environmental policy focused on both local and regional scales.[9]

Isolated management of each of the FEW sectors, the status quo, has resulted in unsustainable, unclosed nutrient loops. For example, consider the movement of nitrogen (N) and phosphorus (P) through processes associated with food production and consumption. Synthetic fertilizers are manufactured from finite resources (i.e., mineral phosphate)[10] and energy intensive processes (i.e., Haber-Bosch process)[11] to supply bioavailable nutrients to agricultural soils. Widespread over-application of fertilizers results in nutrient losses to aquatic ecosystems,[12,13] which disrupt nutrient cycles and cause eutrophication.[14–16] Additionally, following fertilizer and food production, human consumption and excretion concentrate nutrients in wastewater effluents. However, rather than being recycled or utilized in this concentrated form, effluent is regularly discharged into freshwater ecosystems, which both irretrievably dilutes a valuable, finite resource and, paradoxically, contributes to eutrophication of freshwater ecosystems. Although the current operational paradigm for wastewater treatment plants (WWTPs) is to implement nutrient removal technologies to reduce nutrient pollution (advanced or tertiary treatment processes), this stage of treatment is highly energy intensive, requires large capital costs, and depletes available nutrients which are an important and limited resource.[17,18] Shifting to a holistic perspective, however, WWTPs should be seen as a reliable supply of both water and nutrient resources for agriculture rather than simply as a waste disposal service.[19–22] For example, instead of targeting year-round conversion of nutrients from biologically available forms (e.g., ammonium and organic nitrogen) to biologically unavailable forms (e.g., dinitrogen gas) to reduce aquatic nutrient pollution, the operation of WWTPs may be tailored to facilitate nutrient recovery for crop production. This approach would yield energy savings in the production and application of fertilizers, and in the operation of WWTPs. Thus, identifying strategies that close nutrient loops by recycling nutrients from wastewater sources into agricultural production has strong potential to advance the FEW nexus.

In arid-land river corridors, connections between water resources, food production, and nutrient cycles provide unique opportunities to close nutrient loops and subsequently manage multiple sectors of the FEW nexus. WWTPs are often the dominant source of bioavailable nutrients exported from arid-land rivers[23–26] and, therefore, directly recycling wastewater nutrients into agriculture through irrigation may considerably reduce nutrient export, improving water quality and closing nutrient loops. Reclaiming wastewater resources also addresses challenges created by limited water supply, high irrigation rates, and resulting water scarcity in arid-lands.[27,28] Furthermore, arid-land river corridors typically contain high densities of regulatory structures (e.g., dams and weirs) and irrigation infrastructure (e.g., supply canals and drainage ditches) that enhance nutrient retention in river systems via increased residence times and contact with biochemically heterogeneous flowpaths.[7,29–33] Altogether, these features produce high rates of nutrient retention in arid-land basins,[23,34–36] suggesting that well-defined strategies for wastewater reuse can begin closing nutrient loops with implications for holistic resource management of the FEW nexus.

This study investigates the physicochemical viability of an irrigated agricultural system to use reclaimed wastewater resources to meet agricultural water and nutrient requirements in the Middle Rio Grande basin (MRGB) (New Mexico, USA), which sustains a metropolitan area of approximately one million people, including the City of Albuquerque.[37] Research objectives were to: 1) generate a nutrient budget for the Rio Grande and the adjacent irrigation network within the MRGB to characterize the net source/sink behavior of wastewater sources and irrigated agriculture, 2) identify and quantify tradeoffs associated with arid-land wastewater reuse for agriculture within the scope of the FEW nexus, and 3) propose effective nutrient management for advancing the FEW nexus in arid-land basins.

Methods

Site Description

The MRGB of central New Mexico is a major sub-basin of an arid-land river that experiences competing management interests between urban centers, irrigated agriculture, and environmental flows. The MRGB (~ 50,000 km^2) is defined by a 306 km reach of the Rio Grande, which is bounded upstream by the outfall of Cochiti Reservoir and downstream by the inflow to Elephant Butte Reservoir (Figure 1). The MRGB is predominantly classified as shrubland (39%) and rangeland (32%),[38] however, vegetation and land use in the MRGB historic floodplain differs dramatically from the rest of the basin. Agricultural land use occurs on 32% of the MRGB floodplain, which is primarily alfalfa, pasture grasses, and fallow fields. Approximately 54% of the floodplain is currently undisturbed while the remaining 14% of the floodplain has undergone urban development.

The hydrology of the MRGB is controlled by a series of impoundments and diversions that restrict flooding and supply irrigation under the management of the U.S. Army Corps of Engineers and the Middle Rio Grande Conservancy District (MRGCD), respectively. The regulation of the Rio Grande by hydraulic structures is common amongst large arid-land rivers globally.[7] Water entering the MRGB is regulated by releases from Cochiti Reservoir with no significant perennial tributaries or inflows, except WWTP outfalls. Annual peak flows typically occur in May, following snowmelt in the mountainous headwaters, and monsoon precipitation events result in episodic high flows in July-September.[39] During the growing season (March-October), water is diverted

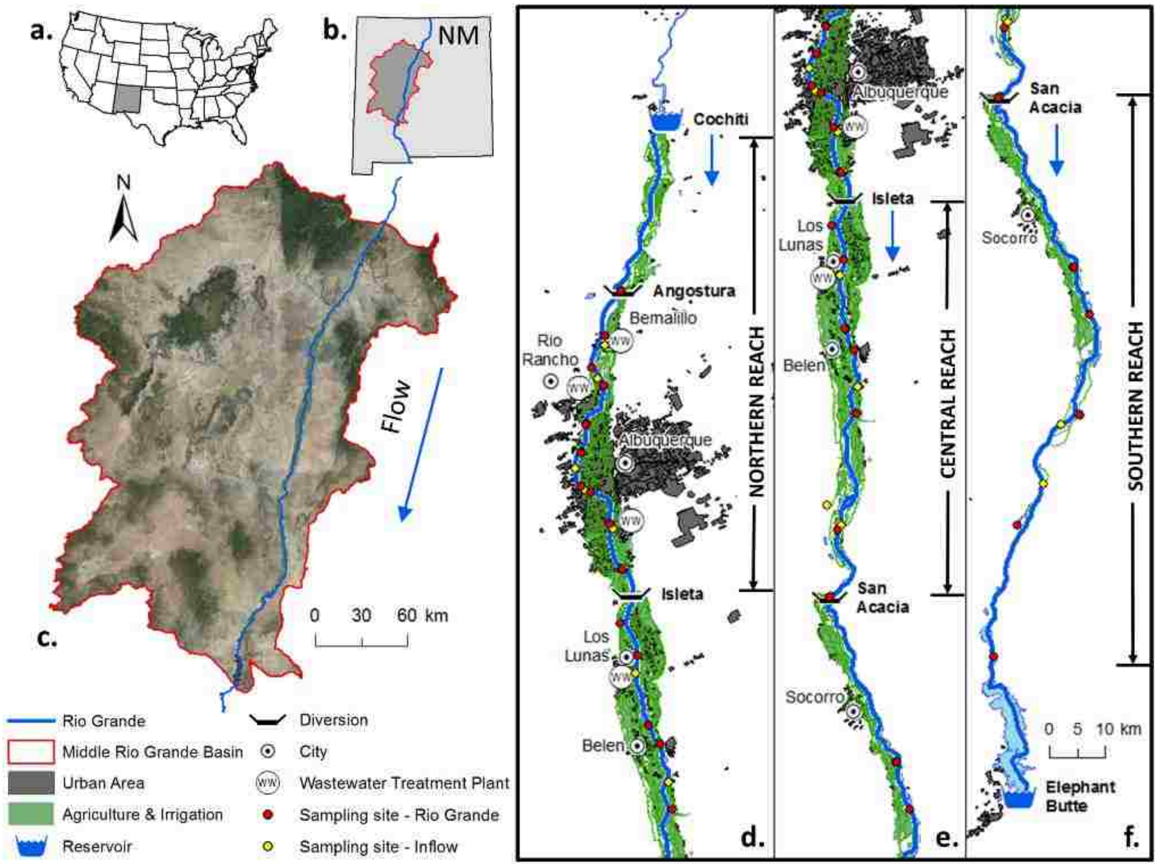

Figure 1. a. New Mexico (NM), USA; **b.** Middle Rio Grande Basin (MRGB), NM; **c.** satellite imagery of the arid-land MRGB (~50,000 km^2) and Rio Grande (306 km); and Rio Grande subreaches for this study: **d.** Northern reach (Cochiti – Isleta, 103 km), **e.** Central reach (Isleta – San Acacia, 85 km), and **f.** Southern reach (San Acacia – Elephant Butte, 118 km). Panels **d**, **e**, and **f** show land use (urban and agricultural), sampling sites, and key features (cities, wastewater treatment plants, reservoirs, and diversions) along the Rio Grande in the MRGB.

into an irrigation network by three low-head dams located 38, 103, and 188 km below Cochiti Reservoir (Angostura, Isleta and San Acacia, respectively) (Figure 1). During growing season months in this study, an average of 17 ± 8 (mean ± standard deviation), 60 ± 27, and 42 ± 25 percent of the Rio Grande was diverted (or remained diverted) from the main channel into the irrigation network at these respective locations. This extensive irrigation network consists of ~ 2,100 km of irrigation ditches and drains which flood-irrigate ~ 25,000 ha of cropland.[40] On average, agricultural drains return water to the mainstem Rio Grande ~ 50 km downstream of where water was diverted from the river. During the non-growing season (November-February) there are no significant withdrawals for irrigation, with water released from Cochiti Reservoir flowing unimpeded to Elephant Butte Reservoir.

Four WWTPs (Bernalillo, Rio Rancho, Albuquerque, and Los Lunas) discharge directly to the Rio Grande (Figure 1). Most notably, the Albuquerque Southside Reclamation Plant is the leading regional source of nutrient inputs, discharging an estimated load of 980 kg/day of dissolved inorganic nitrogen (NO_3-N + NO_2-N + NH_4-N), at an average flowrate of 2.3 m^3/s.[38,41] Discharge from this WWTP accounts for an average of 12% (range 3-22% monthly in this study) of the flow in the adjacent Rio Grande, although this contribution has been observed to exceed 80% during episodic low-flow periods. The dominance of point-source N loads in the MRGB is consistent with other arid-land rivers previously studied in global analyses.[23–26] During the growing season, the agricultural irrigation network has been shown to act as a N sink through the diversion of the Rio Grande downstream of WWTP outfalls.[38]

Data Collection

Grab samples were collected monthly (over a two- to three-day period) from 23 mainstem sites distributed along the entire MRGB reach from September 2005 to January 2008 (28 sampling events). Mainstem sampling sites were located sufficiently downstream of wastewater and irrigation return flows to allow complete transverse mixing as predicted by mixing equations.[42] All samples were collected at approximately mid-depth and as close to the stream thalweg as flows permitted. Samples were collected in 130 ml syringes and immediately filtered in the field through 0.7 μm pore size Whatman® GFF filters. Samples were analyzed for ammonium (NH_4-N), nitrate (NO_3-N), and soluble reactive phosphorus (SRP). Filtered samples for NO_3-N and SRP were stored at 4°C and analyzed within 72 hours. NO_3-N and SRP samples were analyzed by ion chromatography (Dionex, Standard Method EPA 300.1, 2). NH_4-N samples were frozen until analysis, which was performed by the phenol hypochlorite method with a 10 cm flowpath.[43] Grab samples were also collected from the four WWTP outfalls: Bernalillo, Rio Rancho, Albuquerque, and Los Lunas (21, 22, 22, and 19 sampling events, respectively). For months when data were not collected from one or more WWTPs, mean NH_4-N, NO_3-N, and SRP loading rates were calculated from the available data for each WWTP and used to estimate nutrient loading for the respective WWTP (sampling events using mean wastewater loading rates are indicated in Appendix D). Sampling events were performed during periods of stable flow with the exception of seven sampling events when unexpected changes in discharge occurred during the sampling period. Only data gathered during stable flow conditions (21 sampling events) were used for analysis, with the exception of WWTPs which were unaffected by changes in discharge. For 15 of the 21 sampling events with stable flow conditions, grab samples were also collected from agricultural drains. During a few summer months, some of the southern sites on the Rio Grande had no discharge so no samples were taken. Discharge data to estimate nutrient loads were obtained from 17 MRGCD gages, 10 USGS gages, and 4 WWTPs. Concentration and discharge data are shown by sampling event in Appendices E and F.

Aquatic nutrient budgets

A mass balance approach was used to generate an aquatic nutrient budget for each sampling event along the MRGB (Figure 2). Steady-state nutrient loads ($\dot{m}$) [MT^{-1}] were calculated as the product of measured nutrient concentrations (C) [ML^{-3}] and mean monthly discharge (Q) [$L^{3}T^{-1}$]. The mass balance is represented by equation 1 where subscripts represent: in = upstream loading; WW = wastewater loading; ag = agricultural loading; $instr$ = instream processing; and out = downstream export. The net nutrient sources/sinks were attributed to upstream loading, wastewater loading, and the exchanges and reactions along instream (main channel, benthic, and hyporheic zones) and agricultural (irrigation channels, crops/soils) compartments. Specifically, the quantities representing input, output, and agricultural loading were calculated directly from obtained data; input (upstream and wastewater loading) and output (downstream export) were determined from individual samples (concentration and discharge) and agricultural loading was estimated by subtracting loads reentering the main channel via agricultural return drains from the loads exiting the main channel at agricultural diversions.

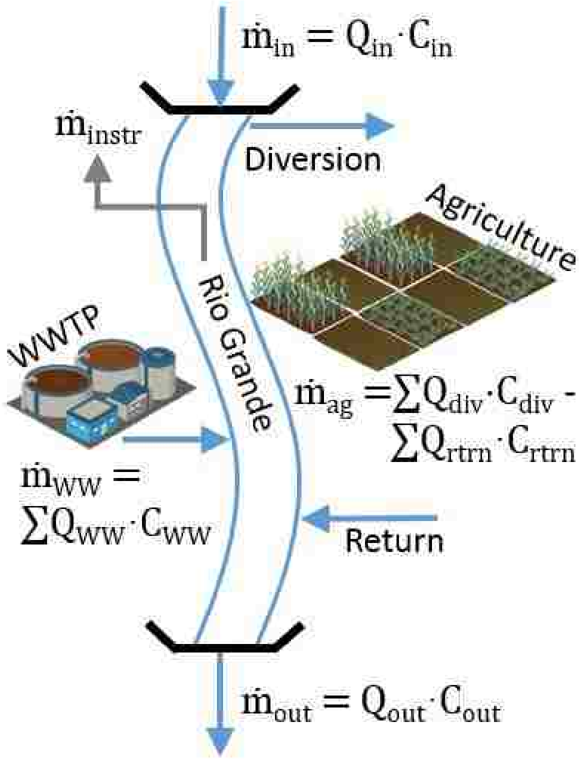

Figure 2. Conceptual mass balance applied to the Rio Grande. Nutrient loads ($\dot{m}$) were calculated as the product of measured nutrient concentrations (C) and mean monthly discharge (Q) for upstream loading (in), wastewater loading (ww), instream processing ($instr$), agricultural loading (ag), and downstream export (out) for each sampling event.

Instream processing was calculated from equation 1 as the loss of nutrients not attributable to agricultural loading. Note that upstream and wastewater loading are net sources, agricultural loading can be a net source or sink (i.e., agricultural retention occurs when agricultural loading is negative), and instream processing is assumed to act as a net sink.

$$dm/dt = \underbrace{(\dot{m}_{in} + \dot{m}_{WW})}_{input} + \underbrace{\dot{m}_{ag}}_{agricultural\ loading} - \underbrace{\dot{m}_{instr}}_{instream\ processing} - \underbrace{\dot{m}_{out}}_{output} \quad (1)$$

Aquatic nutrient load calculations were performed for the entire MRGB reach (Cochiti – Elephant Butte, 306 km) and for the three subreaches between diversions: Northern (Cochiti – Isleta, 103 km), Central (Isleta – San Acacia, 85 km), and Southern (San Acacia – Elephant Butte, 118 km) (Figures 1 and 2). Refer to Appendices A-D for complete calculations.

Results and Discussion

Aquatic nutrient budgets in the MRGB

Wastewater effluent was the primary source of nutrients to the Rio Grande in the MRGB. WWTPs discharged a combined average nutrient load of 1097 ± 282 (mean ± standard deviation) kg/day NO_3-N, 656 ± 146 kg/day SRP and 102 ± 52 kg/day NH_4-N, at a combined average flowrate of 2.6 ± 0.06 m^3/s. The Albuquerque Southside Reclamation Plant (serving ~ 0.6 million people) was the primary contributor to WWTP nutrient loads (83% NO_3-N, 92% SRP, 73% NH_4-N). On average, all WWTPs contributed over 90% of the total nutrient inputs to the Rio Grande in the MRGB. Other nutrient sources include the upper Rio Grande and agricultural drains. Water entering from the upper Rio Grande contributed an average nutrient load of 71 ± 122 kg/day NO_3-N, 31 ± 34 kg/day SRP, and 10 ± 19 kg/day NH_4-N. No seasonal trends were observed for nutrient loads from WWTPs or the upper Rio Grande. During non-growing seasons, agricultural drains were a net source of nutrients, contributing an average load of 131 ± 74 kg/day NO_3-N, 73 ± 11 kg/day SRP, and 19 ± 3.3 kg/day NH_4-N (Figure 3). Each subreach of the irrigation network was a source of nutrients to the Rio Grande during non-growing seasons.

During growing seasons, the agricultural irrigation network retained an average nutrient load of 454 ± 213 kg/day NO_3-N and 316 ± 152 kg/day SRP, or approximately 37% and 45% of the total NO_3-N and SRP inputs, respectively. Water diverted into the irrigation network in the central and southern subreaches contained elevated nutrient

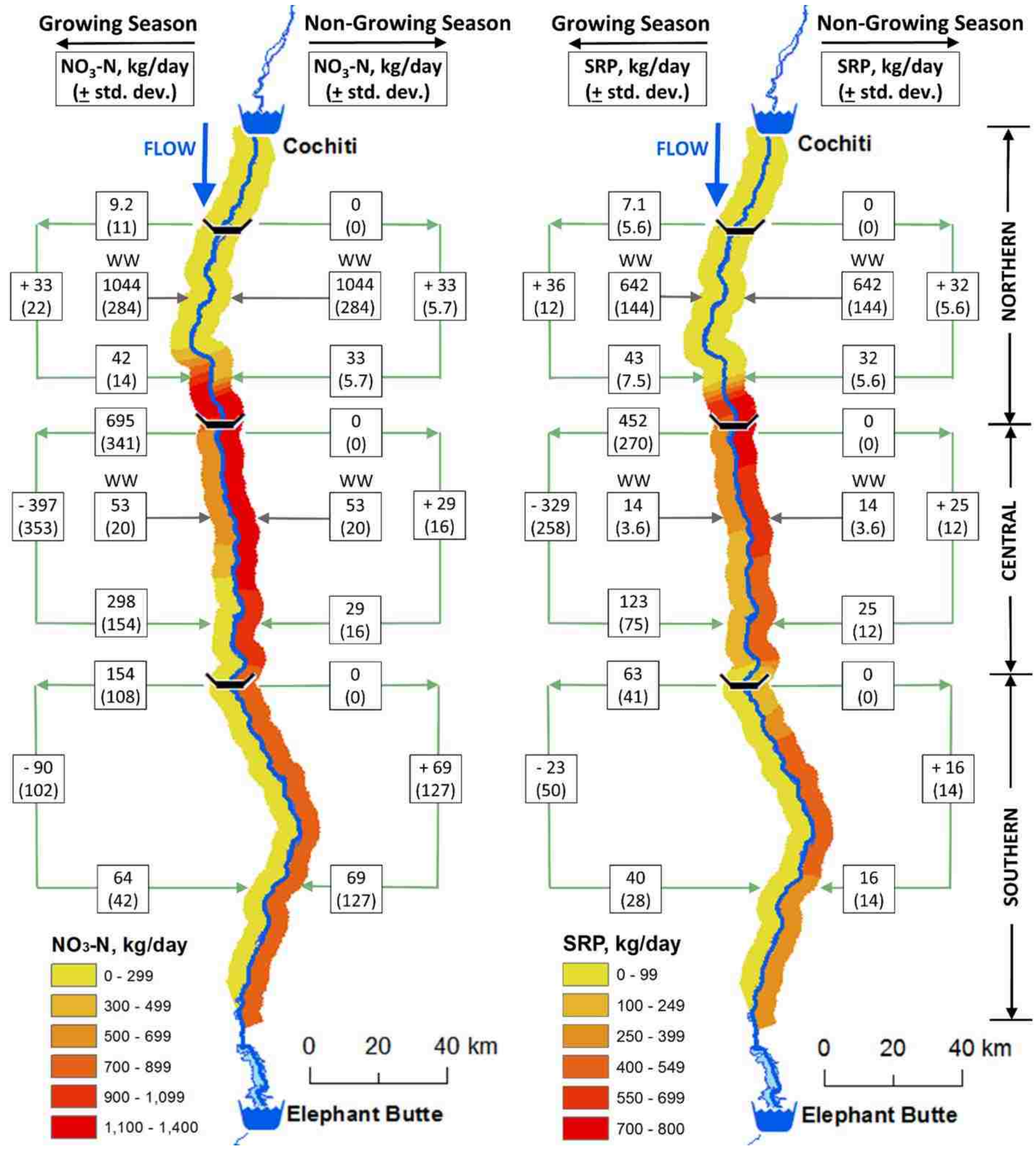

Figure 3. Representative NO_3-N (left) and SRP (right) loads (kg/day) along the Rio Grande study reach (306 km). Growing season (May 2006) and non-growing season (December 2007) months are represented by the left and right river banks, respectively. Mean nutrient loads (± std. dev.) for agricultural diversion/return flows and WWTP effluent for the study period are shown in boxes.

loads due to their location downstream of WWTP outfalls (Figure 1). Loads returned to the Rio Grande by agricultural drains in these subreaches were reduced relative to the load diverted into the irrigation network (Figure 3). The irrigation network in the northern subreach, however, was a source of nutrients during all months. This is likely due to the diversion of low nutrient loads into the irrigation network in the upper portion of the MRGB. The highest rates of agricultural nutrient retention were observed in June-September during growing seasons. These nutrient retention rates varied proportionally to the irrigation rates in the months transitioning between growing seasons and non-growing seasons (e.g., March and October). For example, sampling during March 2007 suggests that the typical flushing of the irrigation network (water circulation through the network without irrigation) taking place at the beginning of the growing season mobilized relatively high loads of NO_3-N to the Rio Grande.

The primary nutrient sinks in the MRGB were instream processing (i.e., main channel, benthic, and hyporheic zones) and retention within the agricultural irrigation network during growing seasons. Instream processing includes denitrification, uptake, seepage, and other biogeochemical processes that may occur as water flows through the main channel of the Rio Grande. Instream processing retained on average 460 ± 204 kg/day NO_3-N and 338 ± 197 kg/day SRP or approximately 38% and 48% of the total NO_3-N and SRP inputs, respectively. Nutrient loads removed by instream processing did not vary significantly (Welch's t-test, $p >> 0.05$ NO_3-N and SRP) between growing seasons and non-growing seasons. On the other hand, the net retention of aquatic nutrients (the sum of instream processing and agricultural retention) in the MRGB varied significantly (Welch's t-test, $p < 0.01$ NO_3-N, $p = 0.01$ SRP) between growing seasons and non-growing seasons due to elevated retention in the irrigation network during agricultural operations (Figure 4). During growing seasons, net retention averaged 77% and 85% of the total NO_3-N and SRP inputs, respectively, with a maximum of 99% for both NO_3-N and SRP inputs. During non-growing seasons, net retention averaged 26% and 50% of the total NO_3-N and SRP inputs, respectively. Net retention was relatively lower in months transitioning between growing seasons and non-growing seasons (e.g., March and October) than during the peak of the growing season. This is likely due to reduced agricultural retention which occurs during these transitions. As a result of existing nutrient sinks in the MRGB, the export of nutrients during growing seasons averaged 22% and 15% of the total NO_3-N and SRP inputs, respectively. During non-growing seasons, downstream export averaged 71% and 48% of the total NO_3-N and SRP inputs, respectively. Analyses of NH_4-N retention were limited by high variability and relatively low loading of this nutrient to the Rio Grande in the MRGB. Net retention averaged 64% of total NH_4-N inputs during the study period (growing and non-growing season months), however, the contributions from agricultural retention and instream processing were less pronounced than for NO_3-N and SRP. Overall, elevated nutrient retention during growing seasons drastically reduced export from the MRGB (Figures 3 and 4).

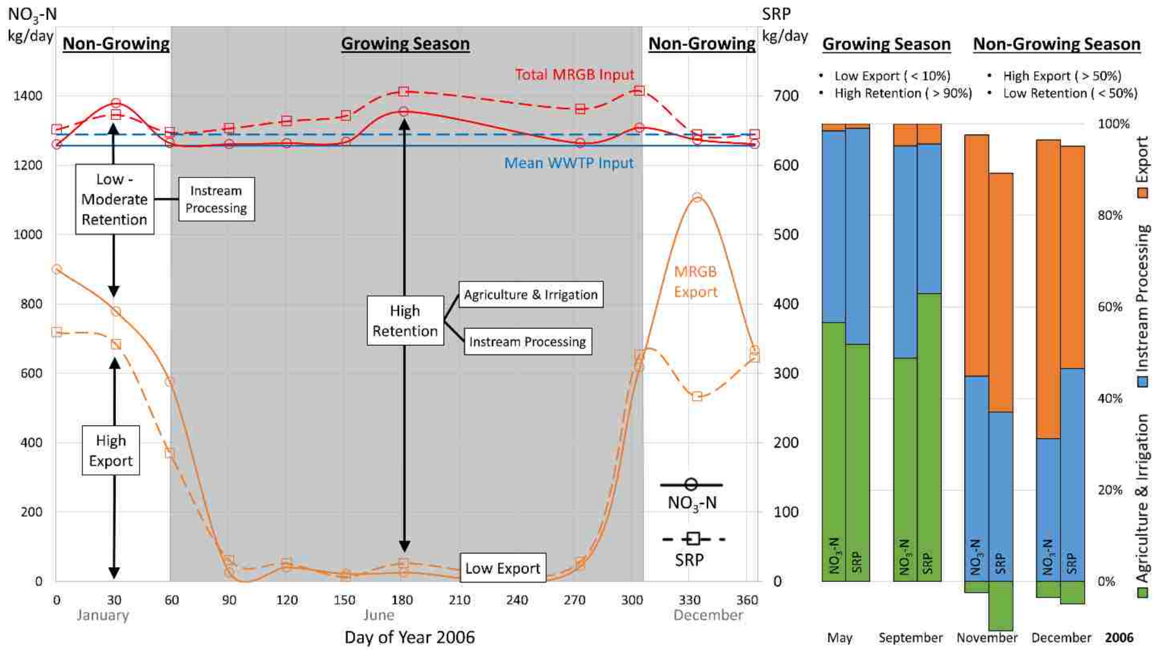

Figure 4. Left) Aquatic nutrient inputs, retention, and export from the Rio Grande in the Middle Rio Grande basin during 2006. NO_3-N is shown by continuous lines and circles using the left axis; SRP is shown by dashed lines and squares using the right axis. **Right)** Nutrient loading partitioned between agriculture, instream processing, and export for growing season (May, Sep. 2006) and non-growing season months (Nov., Dec. 2006). Partitioning is expressed as percentages of total loading for NO_3-N (left columns) and SRP (right columns).

Agriculture and ecosystem services

In the arid-land MRGB, the FEW nexus benefits from the ecosystem services provided by irrigated agriculture. The attenuation of nutrient loads in the agricultural system provides a valuable ecosystem service by improving the water quality leaving the MRGB during growing seasons, limiting eutrophication of downstream water bodies.[44,45] This contrasts to other more humid climatic regions where agriculture is overwhelmingly a nutrient source to receiving waters.[15] Nutrient retention in the MRGB agricultural system is influenced by several factors including: limited N fertilization of dominant crops, flood irrigation practices, and conveyance in the irrigation network. Alfalfa is the dominant crop in the MRGB and requires minimal N application for seedlings (22 kg/ha) and effectively none for mature stands as alfalfa establishes symbiosis with the nitrogen fixing bacteria *Rhizobium*.[46] The low rate of N application in the MRGB limits the supply of N in agricultural soils that may be mobilized to waterways. Alfalfa does require appreciable P application (130 kg P_2O_5/ha) in the MRBG,[47] however, the retention of P fertilizers is likely influenced by sorption. The use of flood irrigation practices introduces several potential pathways for retention as nutrients from wastewater and fertilizer sources are applied to crops. During flood irrigation, water percolates through the soil column into the root zone where uptake of water and nutrients by crops takes place. There, sorption to soil particles may also occur, presenting a mechanism for retaining nutrients, especially SRP.[48–50] This retention mechanism may explain high SRP retention despite the application of P fertilizer. Flood irrigation also simulates natural floodplain conditions that promote denitrification by exposing N-rich water to often oxygen depleted organic-matter rich soils.[51] Additionally, the routing of water through an extensive network of irrigation ditches and drains increases hydraulic residence times and contact between benthic and hyporheic microbes and solutes. Besides increasing contact times, residence time is strongly correlated with nutrient retention in river systems due to biogeochemical processing in aerobic and anaerobic compartments (including denitrification)[52–55] provided sufficient dissolved and particulate organic matter is present, as is the case in most irrigation ditches.[56] Vegetation growth in irrigation ditches has been shown to increase nutrient uptake by providing multiple interfaces for microbial growth and N related processes.[57,58] Finally, prevailing losing conditions causes water to flow from the mainstem of the Rio Grande to the alluvial aquifer where additional nutrient uptake by riparian vegetation occurs before surface water and the remaining nutrients become part of the groundwater system.[59] Together, these factors create favorable conditions for nutrient retention during typical agricultural operations in the MRGB.

Promoting ecosystem services through agricultural management is key to closing nutrient loops and to sustainably achieving FEW resource security in arid-land river corridors.[60,61] In the case of the MRGB, the retention of nutrients resulting from the diversion, conveyance, and irrigation of crops in the arid MRGB is just one example of an ecosystem service provided by the agricultural system. In addition to nutrient retention, the irrigation channels that comprise the irrigation network provide valuable hydrologic, riparian, and agroecosystem functions to the surrounding landscape.[62–64] Seepage from irrigation channels raises local groundwater levels which augments streamflow following the growing season when it is slowly released to the river. Irrigation channels and associated seepage also support areas of riparian vegetation, which improve bank stability, decrease erosion, and create habitat that supports biodiversity in agroecosystems. In arid-land rivers with managed hydrology such as the Rio Grande along the MRGB, overbank flooding and natural floodplain processes are limited, however, the use of irrigation channels and flood irrigation practices can simulate this natural hydrology and its associated benefits. Also, the operation and maintenance of these traditional irrigation channel systems, commonly called *acequias*, are of great historical and cultural importance to the region. Thus, the multi-functional nature of these systems in their current operational state (i.e., unlined channels) should be appreciated when considering potential infrastructure modifications (i.e., impervious lining) or land use changes (i.e., conversion of agricultural land). Sustainable advances in food production will require promoting the provisioning, regulating, supporting, and cultural ecosystem services provided by arid-land agroecosystems.

Closing nutrient loops – Direct wastewater reuse in arid-lands

In arid-land rivers such as the Rio Grande, closing nutrient loops will require increasing the amount of nutrients recycled from wastewater effluent (typically the leading nutrient source) into crop production. The role of the agricultural irrigation network as a nutrient sink in the MRGB suggests that direct wastewater reuse for agriculture is an effective strategy to increase recycling of wastewater derived nutrients in arid-land rivers. Currently, wastewater nutrients remaining after advanced treatment processes (i.e., nitrification/denitrification) are indirectly supplied to agriculture by the diversion of the Rio Grande downstream of WWTP outfalls. However, this process of indirect reuse leads to several inefficiencies in the context of nutrient recycling. Once discharged to the river, nutrients are irretrievably diluted by mixing and, therefore, at downstream diversions, the wastewater nutrient load is co-allocated between the irrigation network and the downstream river reach. For example, approximately 60% of the river is diverted at the Isleta diversion during the growing season, leaving the remaining nutrient load to degrade by instream processing or contribute to downstream nutrient export. Direct wastewater reuse would maximize the amount of wastewater nutrients supplied to agriculture by minimizing nutrient losses to the Rio Grande. Wastewater discharges were consistently lower than agricultural diversions during the growing season in the MRGB, which means that all wastewater could be utilized by agriculture, although additional withdrawals from the river would be needed to augment water supplies. The co-location of WWTPs and the irrigation network in the Rio Grande floodplain would allow for direct wastewater conveyance with minimal required modifications to existing infrastructure. While direct wastewater reuse for agriculture is expected to achieve significant nutrient savings, water savings are unlikely to be observed along the Rio Grande because wastewater is currently being discharged to the river and diverted downstream. Hence, wastewater does not represent a new source of water for irrigation but rather an existing source of water with dissolved nutrients which can be recycled.

There are opportunities for improving nutrient management within the irrigation network. Aquatic vegetation increases nutrient retention in irrigation channels,[57,58] therefore, regulating vegetation may control where nutrients are retained in the agricultural system. For example, minimizing vegetation in supply channels could maximize the amount of wastewater nutrients available to crops during flood irrigation, while accumulating vegetation in drainage channels could attenuate remaining nutrients (not taken up by crops) prior to return to the mainstem river. Although the removal of vegetation may be desirable to maximize nutrient availability during flood irrigation, vegetation should also be considered for its role in improving channel stability and mitigating sediment and nutrient export associated with erosion.[65] Existing irrigation infrastructure could also be modified to increase nutrient retention by adding flow control structures that increase residence times,[66] altering channel geometry to improve retention at high flows,[65] or using restoration structures to enhance hyporheic flow and nutrient cycling.[67] Implementation of such features should occur downstream of agricultural fields (i.e., drainage ditches) in order to attenuate nutrients not retained by crops during flood irrigation. During the non-growing season, the irrigation network could continue to be used to convey wastewater and mitigate nutrient loads returned to the river. This would allow for improved nutrient management throughout the year.

In addition to recycling wastewater nutrients in arid-land rivers, closing nutrient loops will require meeting agricultural nutrient demands through renewable sources. In the MRGB, P fertilizer is recommended for the cultivation of alfalfa, the dominant crop type. Approximately 8,000 ha of alfalfa were harvested annually in the MRGB between 2005-07,[68,69] representing a total fertilizer demand of ~ 1,000 Mg P_2O_5 (~ 450 Mg P). This estimate is representative of current P requirements because of relatively stable production trends in the MRGB. During growing seasons, treated wastewater contributed ~ 154 Mg SRP (~ 50 Mg P) or 11% of the recommended P fertilizer for the MRGB. Therefore, under the current treatment conditions, treated wastewater is unlikely to satisfy all the P requirements of alfalfa crops in the MRGB. However, managing wastewater resources for agriculture introduces tradeoffs between wastewater treatment and nutrient availability that have potential benefits within the scope of the FEW nexus. For example, reducing advanced wastewater treatment processes to increase nutrient availability for agriculture (i.e., moving from tertiary treatment to secondary treatment) will also decrease energy consumption at WWTPs.[70,71] Raw wastewater has a typical SRP concentration (~ 10 mg/L) much greater than treated wastewater effluent (2.7 ± 1.4 mg/L SRP in this study). Assuming the above SRP concentration of raw wastewater, the available supply of P from WWTPs located along the MRGB during the growing season can be estimated as ~ 570 Mg SRP (~ 186 Mg P), or approximately 41% of the recommended P fertilizer. While these values are likely over-estimates for available P fertilizer due to nutrient retention associated with conveyance in the irrigation network, they are meant to illustrate the significant increase in available nutrients by reducing the level of wastewater treatment. Additionally, continual irrigation with nutrient enriched water may increase crop P use efficiency when compared to single application of synthetic fertilizer,[72] thus requiring less overall P. Although decreasing wastewater treatment could increase the quantity of nutrients available for agricultural use, additional renewable sources of P such as livestock manure and food wastes would need to be recycled to completely satisfy nutrient requirements in the MRGB from renewable sources.

Irrigation with wastewater occurs globally, primarily in areas of water scarcity such as the Near East, Australia, and the Southwestern U.S.[27,73] Accordingly, wastewater is used to increase food production by augmenting limited water supplies that would otherwise restrict irrigated agriculture. The nutrient content of reclaimed wastewater is commonly acknowledged to benefit soil productivity and crop yields,[74–76] however, managing wastewater nutrients to maximize sustainable agricultural benefits has received limited attention.[77] With the future direction of wastewater treatment becoming more holistic in terms of resource recovery and environmental sustainability,[22,78] expanding wastewater reuse can help realize these goals through nutrient recycling and energy savings from reduced treatment and fertilizer production and transportation. Additionally, in the MRGB, treated wastewater discharged during the growing season represents an estimated annual fertilizer value of approximately $450,000 in N and $270,000 in P,[79] which illustrates the potential economic benefit of reclaiming wastewater nutrient resources for food production. As noted previously, reducing wastewater treatment can increase these values as more nutrients are made available for agricultural use. While irrigation with reclaimed water can benefit food production by supplying organic matter and nutrients to agricultural soils, additional wastewater constituents must be considered for adverse impacts when using reclaimed wastewater. These constituents include salinity, sodicity, heavy metals, and pathogens, which in high concentrations retard plant water uptake, alter soil structure, increase toxicity, and affect public health, respectively. Wastewater irrigation schemes must address these constituents with special attention to public health, environmental risks, and long-term accumulation in soils.[80,81] Various solutions have addressed these concerns in wastewater irrigation, including diluting wastewater (already practiced indirectly in the MRGB), leaching of constituents through the soil profile, source control (i.e., restricting saline sewer discharges), and wastewater treatment process control.[27,74] Currently, the development and implementation of treatment technologies specifically targeting recovery of nutrient resources for agriculture (in liquid effluents or solid precipitates) while removing adverse wastewater constituents remains a key research area within the FEW nexus. It should also be noted that while it is desirable to maximize the supply of nutrients to agriculture, excessive nutrient inputs can lead to over-fertilization of crops with potential detrimental effects to yield, maturity, and disease resistance.[27] Groundwater contamination should also be considered under wastewater irrigation as nitrates and other solutes may leach through the soil profile to groundwater. Furthermore, sorption, one of the potential mechanisms explaining observed high rates of SRP retention, also suggests that repeated irrigation with high concentrations of dissolved P may cause substantial P accumulation, a long-term legacy (i.e., saturation of sorption sites eventually leading to P export). Although the potential exists for adverse conditions in wastewater irrigation, proper awareness, management, and monitoring has mitigated these factors and led to successful implementation in global arid-lands.[74,82–84]

Transferability to global arid river corridors

Arid-land regions are globally significant in terms of land area (over 40% of Earth's surface), population (over 1/3 human population), and food production (nearly 50% of the world's livestock and cultivated land).[6] However, these regions are characterized by nutrient poor soils, high erosion rates, water scarcity, and low agricultural yields, which lead to food insecurity.[6,8,85] Additional factors such as rapid population growth and climate change place extra pressure on the FEW nexus. Based on findings in the MRGB, direct wastewater reuse may be an effective strategy to advance the FEW nexus of arid-land regions and address these regional challenges.

For both NO_3-N and SRP export flux, arid-land basins show an increasing trend with population density, and the values reported in this study for the MRGB are comparable to those in other arid catchments (Figure 5). This behavior is supported by previous studies which have indicated that arid-land rivers are more sensitive to point sources (i.e., wastewater discharges) than rivers in humid basins. In comparison, humid basins show a more complex response to increasing population density, with a slight increase in export from low population densities to ~ 10^3 people km^{-2}, followed by a decline in export with increasing densities.[23–26] Differing nutrient sources and responses in arid and humid basins have implications for basin-specific management of water and nutrient resources. In arid-land rivers where nutrient export is strongly influenced by point sources, direct wastewater reuse for agriculture may mitigate downstream nutrient export while beneficially reusing nutrient resources for food production. However, in order to provide an appreciable quantity of water and nutrients to agriculture under wastewater reuse scenarios, a sufficient population is required to generate wastewater. Previous studies of arid-land basins show that population densities span several orders of magnitude (Figure 5). In relation to the MRGB, other arid-land basins have similar or greater population densities. This suggests that there is potential to implement wastewater reuse for agriculture and achieve FEW nexus benefits in arid-lands globally. Furthermore, population growth and urbanization will increase generation of domestic wastewater, consequently increasing point source nutrient loads along populated arid river corridors.[86,87] In places where agriculture acts as a nutrient sink, wastewater irrigation can provide a holistic solution to address challenges related to urban nutrient pollution and agricultural production.

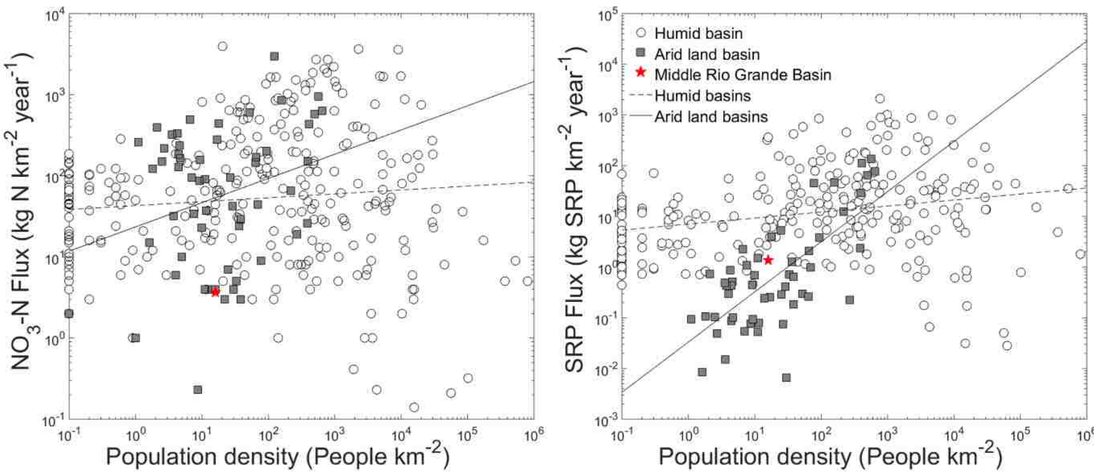

Figure 5. NO_3-N (left) and SRP (right) export (expressed as catchment flux) versus population density for humid (circles) and arid-land basins (squares) including the Middle Rio Grande Basin (star). Trend lines are shown for humid (dashed) and arid (solid) basins. Trend lines were fit using linear least squares regression. Data obtained from Alvarez-Cobelas et al.[35,36]

Mechanisms controlling nutrient retention in the MRGB have been observed in other arid-land rivers. Low nutrient export has been observed in the Amu Darya River of central Asia, the Ebro River of Spain, and the Gila River of the Southwestern U.S. The semi-arid Amu Darya River irrigates over 3.6 million hectares of agricultural land and lies within Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan, and Afghanistan. The recirculation of irrigation water within the Amu Darya irrigation network explained observed decreases in N export from the basin despite increases in N inputs (increased fertilizer application) over a 40 year period.[33] Similarly, the Ebro basin receives high N loading from fertilizers, however, the high density of irrigation channels and reservoirs in the Ebro irrigation network contribute to high retention (91% of N inputs) within the basin.[30] In the Gila River of the Central Arizona-Phoenix ecosystem, high rates of N and P retention have also been reported.[88,89] Nutrient retention in this system is strongly influenced by water conservation practices that recycle wastewater effluent for agricultural reuse and aquifer recharge. Further, high rates of inorganic N retention have also been observed in several large arid-land basins including the Murray-Darling, Nile, and Orange River basins.[23,34] Extensive agricultural development has occurred adjacent to each of these arid-land rivers and may explain the low nutrient export. The Murray-Darling Basin (MDB) is the largest and most productive agricultural region in Australia.[90] Similarly, 90% of the Nile Delta is under cultivation and is one of the most agriculturally productive areas in Egypt.[91] The arid portion of the lower Orange River supports ~71,000 ha of irrigated agricultural production.[92] The irrigated portion of each of these systems contains an extensive network of ditches and drains that supply water to fields and drain excess water back into the river, preventing soils from salinizing. The

MDB contains over 6,000 km of irrigation drains, which have been shown to be a potential sink for nutrients.[93] After the closure of the Aswan High Dam, over 13,000 km of irrigation drains were constructed in the Nile Delta.[94] An extensive network of irrigation ditches has been constructed along the Orange River to connect the numerous impoundments to irrigated farmland.[95] Although a range of irrigation practices is used in each of the three systems, some form of flood irrigation is common in each system.[95–98] While observed nutrient retention is high within these arid basins, nutrients are not intentionally managed for agricultural benefits. Hence, potential exists to maximize tradeoffs related to nutrient cycles and the FEW nexus of global arid-lands.

Conclusion

Overcoming impending resource challenges in the FEW nexus is not likely to be met by a singular, all-encompassing approach or technological development. Rather, advancing the FEW nexus will require strategies tailored to the conditions and needs at local and regional scales. Using the MRGB, direct wastewater reuse is identified as a strategy to advance the local FEW nexus of an arid-land river basin with potential transferability to arid-land regions globally. Future work is needed to understand and address local factors and constraints to wastewater-nutrient reuse in the MRGB and to dynamically model tradeoffs between agricultural producers, wastewater managers, and the environment to optimize nexus performance. Beyond wastewater reuse, additional research is also needed to understand how to effectively recycle other alternative, renewable nutrient sources (i.e., livestock and food wastes) to completely close the nutrient loop between food production and consumption.

APPENDICES

Appendix A: NO_3-N nutrient budgets

Table Legend

Month – Month of sampling event (MON_YR)

in – Upstream loading

WW – Wastewater loading

div – Load diverted to agriculture

rtrn – Load returned from agriculture

ag – Agricultural loading

out – Downstream export

net – Net retention (net = (in + WW) – out, net = ag + instr)

instr – Instream processing

NO_3-N – Nitrate as nitrogen

SRP – Soluble reactive phosphorus

NH_4-N – Ammonium as nitrogen

Table A-1 Northern subreach NO_3-N nutrient budget

Month	in	WW	div	rtrn	ag	out	instr	net
SEP_05	3.65	1092.36	1.15	37.88	36.74	1029.65	103.10	66.36
OCT_05	15.67	1889.33	3.71			1828.79		76.22
NOV_05	6.42	2149.94	0.08			2206.29		-49.93
DEC_05	3.53	1335.68	0.03			1404.87		-65.67
JAN_06	122.35	1690.63	0.37			1666.17		146.81
FEB_06	7.42	613.47	0.00	31.64	31.64	698.13	-45.59	-77.23
MAR_06	4.40	1227.12	0.87			1188.26		43.25
APR_06	7.26	1516.55	1.27			1551.29		-27.48
MAY_06	10.86	1343.59	1.86	35.56	33.70	1373.63	14.53	-19.17
JUN_06	98.65	1046.90	14.46			1126.19		19.36
JUL_06	54.99	1061.11	7.86	31.80	23.94	1157.63	-17.60	-41.54
AUG_06	74.86	866.49	14.64	26.82	12.18	934.62	18.91	6.72
SEP_06	7.37	806.74	1.37	37.05	35.68	824.10	25.69	-9.99
OCT_06	52.06	1187.55	4.03	40.57	36.54	1281.51	-5.36	-41.90
NOV_06	16.98	1924.11	0.00	34.00	34.00	1955.19	19.90	-14.09
DEC_06	4.30	861.47	0.00			934.69		-68.92
JAN_07	36.06	812.25	0.00	23.48	23.48	985.22	-113.43	-136.90
FEB_07	19.89	570.47	2.35	30.54	28.19	683.62	-65.06	-93.25
MAR_07	461.52	1322.08	19.61	42.66	23.05	1746.64	60.01	36.96
APR_07	15.49	854.30	2.44	22.00	19.56	950.32	-60.97	-80.53
MAY_07	370.02	1386.50	25.33	24.89	-0.44	1726.68	29.40	29.84
JUN_07	122.80	1478.34	26.91	27.02	0.12	1576.63	24.63	24.51
JUL_07	11.17	1332.78	2.95	52.19	49.25	1471.42	-78.22	-127.47
AUG_07	35.77	856.80	8.94	47.47	38.53	910.65	20.45	-18.08
SEP_07	8.89	722.85	2.49	57.71	55.22	748.58	38.37	-16.85
OCT_07	7.31	987.66	0.16	70.16	70.01	1112.74	-47.77	-117.78
DEC_07	119.68	1044.57	0.00	35.71	35.71	1258.87	-58.91	-94.62
JAN_08	74.21	794.57	0.00	38.43	38.43	935.57	-28.36	-66.79

Notes:
All values are in units of kg/day.
Red indicates months which were excluded due to unstable flow conditions during sampling.
Blanks are shown for values where insufficient data were collected.

Table A-2 Central subreach NO_3-N nutrient budget

Month	in	WW	div	rtrn	ag	out	instr	net
SEP_05	1029.65	47.61	974.86	346.89	-627.97	338.26	111.03	739.00
OCT_05	1828.79	53.29	1332.32			596.62		1285.45
NOV_05	2206.29	53.29	139.11			1539.71		719.87
DEC_05	1404.87	53.29	106.67			1234.60		223.56
JAN_06	1666.17	53.29	146.91			908.10		811.36
FEB_06	698.13	38.78	28.65			657.57		79.33
MAR_06	1188.26	53.29	842.66	247.92	-594.73	340.25	306.56	901.29
APR_06	1551.29	53.29	1089.64			349.86		1254.72
MAY_06	1373.63	27.22	845.54	166.45	-679.09	145.72	576.04	1255.13
JUN_06	1126.19	53.29	501.63	253.75	-247.87			
JUL_06	1157.63	21.27	883.91			784.82		394.09
AUG_06	934.62	13.02	634.13	175.06	-459.08	341.57	146.99	606.07
SEP_06	824.10	91.27	661.73	307.43	-354.29	324.05	237.03	591.33
OCT_06	1281.51	45.77	495.63	486.87	-8.76	1812.59	-494.07	-485.31
NOV_06	1955.19	56.46	0.00			2256.53		-244.88
DEC_06	934.69	82.68	0.00			1101.93		-84.55
JAN_07	985.22	98.07	0.00	11.99	11.99	1246.83	-151.55	-163.54
FEB_07	683.62	56.67	186.09	251.96	65.88	710.36	95.80	29.92
MAR_07	1746.64	68.79	383.51			1443.14		372.30
APR_07	950.32	60.83	474.82			774.15		237.00
MAY_07	1726.68	50.12	240.45			1681.43		95.37
JUN_07	1576.63	53.29	1214.38	198.46	-1015.92	111.38	502.61	1518.53
JUL_07	1471.42	24.84	1261.44	541.75	-719.69			
AUG_07	910.65	19.50	860.80	430.14	-430.65	400.37	99.13	529.78
SEP_07	748.58	53.29	447.22	472.45	25.23	518.62	308.47	283.25
OCT_07	1112.74	59.36	40.67	23.82	-16.85	1102.03	53.22	70.07
DEC_07	1258.87	83.32	0.00	43.87	43.87	769.25	616.82	572.95
JAN_08	935.57	66.89	0.00	32.19	32.19	1090.88	-56.22	-88.41

Notes:
All values are in units of kg/day.
Red indicates months which were excluded due to unstable flow conditions during sampling.
Blanks are shown for values where insufficient data were collected.

Table A-3 Southern subreach NO_3-N nutrient budget

Month	in	div	rtrn	ag	out	instr	net
SEP_05	338.26	241.80	70.10	-171.70	74.10	92.46	264.15
OCT_05	596.62	291.07			185.32		411.30
NOV_05	1539.71	0.00			702.51		837.20
DEC_05	1234.60	0.00			899.38		335.22
JAN_06	908.10	0.00			777.90		130.20
FEB_06	657.57	0.00	328.77	328.77	574.90	411.44	82.67
MAR_06	340.25	173.70			25.77		314.48
APR_06	349.86	176.32	33.25	-143.07	40.30	166.49	309.56
MAY_06	145.72	138.83	2.56	-136.27	21.46	-12.01	124.26
JUN_06			3.82		25.43		
JUL_06	784.82	221.91	177.18	-44.73	2178.99	-1438.90	-1394.18
AUG_06	341.57	58.26	269.25	210.98	681.43	-128.88	-339.86
SEP_06	324.05	187.85	64.61	-123.24	43.45	157.36	280.60
OCT_06	1812.59	187.21	122.74	-64.46	616.32	1131.81	1196.27
NOV_06	2256.53	0.00	7.40	7.40	1106.75	1157.17	1149.77
DEC_06	1101.93	0.00	20.40	20.40	665.59	456.74	436.34
JAN_07	1246.83	0.00	17.29	17.29	702.91	561.21	543.92
FEB_07	710.36	0.00	57.59	57.59	636.97	130.99	73.40
MAR_07	1443.14	0.00	93.13	93.13	1204.86	331.41	238.28
APR_07	774.15	232.80	60.43	-172.36	694.46	-92.67	79.69
MAY_07	1681.43	113.18	90.72	-22.46	1204.35	454.62	477.08
JUN_07	111.38	85.71			10.79		100.59
JUL_07							
AUG_07	400.37	338.27	96.08	-242.19	110.71	47.47	289.66
SEP_07	518.62	270.05			78.13		440.50
OCT_07	1102.03	3.36	5.21	1.85	602.07	501.82	499.96
DEC_07	769.25	0.00	22.39	22.39	806.86	-15.23	-37.62
JAN_08	1090.88	0.00	19.95	19.95	858.22	252.61	232.66

Notes:
All values are in units of kg/day.
Red indicates months which were excluded due to unstable flow conditions during sampling.
Blanks are shown for values where insufficient data were collected.

Appendix B: SRP nutrient budgets

Table B-1 Northern subreach SRP nutrient budget

Month	in	WW	div	rtrn	ag	out	instr	net
SEP_05	65.21	1034.10	20.46	28.57	8.11	1053.64	53.77	45.67
OCT_05	6.27	642.04	1.48			625.39		22.92
NOV_05	12.84	642.04	0.16			650.42		4.47
DEC_05	7.06	642.04	0.06			646.91		2.19
JAN_06	28.45	642.04	0.09			636.58		33.92
FEB_06	2.97	491.95	0.00	28.86	28.86	527.51	-3.73	-32.59
MAR_06	8.79	642.04	1.74			610.93		39.91
APR_06	19.36	642.04	3.39			644.07		17.33
MAY_06	27.16	618.65	4.66	44.92	40.26	667.42	18.65	-21.61
JUN_06	61.65	790.36	9.04			854.85		-2.83
JUL_06	39.82	853.32	5.69	57.12	51.43	925.58	18.98	-32.44
AUG_06	64.16	609.39	12.55	30.84	18.29	694.30	-2.45	-20.74
SEP_06	36.85	581.67	6.83	38.15	31.32	629.40	20.44	-10.89
OCT_06	63.02	868.70	4.88	47.72	42.84	932.42	42.14	-0.70
NOV_06	0.00	390.34	0.00	35.40	35.40	445.17	-19.43	-54.83
DEC_06	0.00	585.83	0.00			593.46		-7.62
JAN_07	5.41	667.74	0.00	24.72	24.72	707.22	-9.35	-34.07
FEB_07	0.00	600.17	0.00	26.73	26.73	672.82	-45.91	-72.64
MAR_07	86.54	632.13	3.68	46.84	43.17	682.87	78.96	35.79
APR_07	33.55	549.16	5.29	51.65	46.36	604.16	24.91	-21.45
MAY_07	136.32	532.90	9.33	38.17	28.84	624.55	73.52	44.68
JUN_07	23.17	415.49	5.08	34.93	29.86	453.05	15.47	-14.39
JUL_07	55.87	553.27	14.73	52.47	37.74	627.73	19.15	-18.59
AUG_07	46.50	669.22	11.62	51.57	39.95	732.68	22.99	-16.96
SEP_07	12.70	424.52	3.56	50.08	46.52	476.69	7.04	-39.48
OCT_07	51.14	895.66	1.11	47.17	46.07	937.38	55.49	9.42
DEC_07	25.29	676.32	0.00	38.94	38.94	766.34	-25.80	-64.74
JAN_08	1.51	684.08	0.00	34.31	34.31	701.81	18.09	-16.22

Notes:
All values are in units of kg/day.
Red indicates months which were excluded due to unstable flow conditions during sampling.
Blanks are shown for values where insufficient data were collected.

Table B-2 Central subreach SRP nutrient budget

Month	in	WW	div	rtrn	ag	out	instr	net
SEP_05	1053.64	12.39	997.57	120.26	-877.30	125.21	63.51	940.81
OCT_05	625.39	14.26	455.61			199.32		440.33
NOV_05	650.42	14.26	41.01			423.42		241.26
DEC_05	646.91	14.26	49.12			599.34		61.83
JAN_06	636.58	14.26	56.13			359.98		290.86
FEB_06	527.51	9.05	21.64			482.65		53.91
MAR_06	610.93	14.26	433.24	101.54	-331.71	210.44	83.04	414.75
APR_06	644.07	14.26	452.40			203.93		454.40
MAY_06	667.42	12.29	410.83	85.23	-325.61	289.58	64.53	390.14
JUN_06	854.85	14.26	380.77	102.22	-278.55			
JUL_06	925.58	21.45	706.72			267.95		679.07
AUG_06	694.30	5.77	471.08	56.65	-414.43	75.80	209.84	624.27
SEP_06	629.40	20.75	505.39	127.79	-377.60	177.16	95.39	472.98
OCT_06	932.42	16.63	360.62	269.66	-90.96	832.01	26.08	117.04
NOV_06	445.17	10.43	0.00			453.15		2.44
DEC_06	593.46	12.18	0.00			621.27		-15.63
JAN_07	707.22	14.28	0.00	11.87	11.87	698.32	35.05	23.18
FEB_07	672.82	14.12	183.15	132.29	-50.85	246.45	389.63	440.48
MAR_07	682.87	17.07	149.94			248.82		451.13
APR_07	604.16	20.17	301.86			327.75		296.58
MAY_07	624.55	13.72	86.97			494.83		143.44
JUN_07	453.05	14.26	348.96	66.66	-282.29	65.03	119.98	402.28
JUL_07	627.73	12.63	538.15	171.31	-366.84			
AUG_07	732.68	13.86	692.57	168.70	-523.87	138.62	84.05	607.92
SEP_07	476.69	14.26	284.79	161.78	-123.01	217.72	150.22	273.23
OCT_07	937.38	21.55	34.26	3.14	-31.12	613.45	314.36	345.48
DEC_07	766.34	10.11	0.00	35.62	35.62	389.24	422.84	387.22
JAN_08	701.81	12.46	0.00	26.58	26.58	671.76	69.10	42.51

Notes:
All values are in units of kg/day.
Red indicates months which were excluded due to unstable flow conditions during sampling.
Blanks are shown for values where insufficient data were collected.

Table B-3 Southern subreach SRP nutrient budget

Month	in	div	rtrn	ag	out	instr	net
SEP_05	125.21	90.15	31.31	-58.84	17.64	48.73	107.57
OCT_05	199.32	102.76			63.77		135.55
NOV_05	423.42	0.00			187.81		235.61
DEC_05	599.34	0.00			359.09		240.25
JAN_06	359.98	0.00			341.52		18.46
FEB_06	482.65	0.00	41.49	41.49	185.06	339.08	297.59
MAR_06	210.44	86.70			30.51		179.93
APR_06	203.93	81.61	31.07	-50.54	25.97	127.42	177.96
MAY_06	289.58	59.36	3.79	-55.57	6.53	227.48	283.05
JUN_06			40.75		25.89		
JUL_06	267.95	84.75	111.01	26.26	202.12	92.09	65.83
AUG_06	75.80	18.08	80.20	62.13	129.63	8.30	-53.83
SEP_06	177.16	88.88	33.00	-55.88	28.29	92.99	148.87
OCT_06	832.01	81.06	55.91	-25.15	326.77	480.09	505.24
NOV_06	453.15	0.00	13.41	13.41	266.39	200.18	186.77
DEC_06	621.27	0.00	13.91	13.91	322.33	312.85	298.94
JAN_07	698.32	0.00	15.47	15.47	347.66	366.13	350.66
FEB_07	246.45	0.00	22.51	22.51	178.66	90.30	67.79
MAR_07	248.82	0.00	38.17	38.17	292.30	-5.32	-43.49
APR_07	327.75	97.45	28.69	-68.76	144.84	114.15	182.91
MAY_07	494.83	45.48	105.58	60.10	372.90	182.04	121.94
JUN_07	65.03	48.62			33.91		31.12
JUL_07							
AUG_07	138.62	118.82	39.28	-79.54	49.15	9.93	89.47
SEP_07	217.72	91.36			53.79		163.93
OCT_07	613.45	1.31	21.11	19.80	169.84	463.41	443.61
DEC_07	389.24	0.00	0.00	0.00	330.78	58.46	58.46
JAN_08	671.76	0.00	14.01	14.01	314.17	371.60	357.59

Notes:
All values are in units of kg/day.
Red indicates months which were excluded due to unstable flow conditions during sampling.
Blanks are shown for values where insufficient data were collected.

Appendix C: NH_4-N nutrient budgets

Table C-1 Northern subreach NH_4-N nutrient budget

Month	in	WW	div	rtrn	ag	out	instr	net
SEP_05	0.00	31.92	0.00	5.11	5.11	36.41	0.62	-4.49
OCT_05	0.00	68.28	0.00			47.65		20.63
NOV_05	0.00	82.52	0.00			61.89		20.63
DEC_05	11.64	61.35	0.09			56.48		16.51
JAN_06	0.00	50.48	0.00			39.52		10.97
FEB_06	9.33	66.83	0.00	19.61	19.61	75.29	20.48	0.87
MAR_06	0.00	79.49	0.00			62.39		17.10
APR_06	0.00	144.03	0.00			123.40		20.63
MAY_06	0.00	98.26	0.00	2.33	2.33	67.58	33.01	30.68
JUN_06		91.24						
JUL_06	15.26	258.70	2.18	5.57	3.39	218.28	59.07	55.68
AUG_06	11.77	54.43	2.30	8.84	6.54	27.53	45.22	38.68
SEP_06	0.00	79.65	0.00	4.82	4.82	45.63	38.84	34.02
OCT_06	0.00	34.35	0.00	9.05	9.05	17.25	26.15	17.10
NOV_06	21.97	61.75	0.00	20.83	20.83	73.27	31.28	10.45
DEC_06	0.00	83.90	0.00			75.10		8.80
JAN_07	0.00	25.14	0.00	10.73	10.73	16.72	19.15	8.42
FEB_07	0.00	60.09	0.00	4.66	4.66	53.41	11.34	6.68
MAR_07	62.02	127.54	2.64	8.13	5.50	162.95	32.10	26.60
APR_07	0.00	108.84	0.00	9.93	9.93	114.16	4.61	-5.32
MAY_07	52.58	212.63	3.60	2.00	-1.60	204.67	58.94	60.54
JUN_07	15.75	37.43	3.45	4.91	1.45	40.91	13.73	12.27
JUL_07		91.24						
AUG_07		91.24						
SEP_07		91.24						
OCT_07		91.24						
DEC_07		91.24						
JAN_08	0.00	179.65	0.00	11.74	11.74	149.23	42.16	30.42

Notes:
All values are in units of kg/day.
Red indicates months which were excluded due to unstable flow conditions during sampling.
Blanks are shown for values where insufficient data were collected.

Table C-2 Central subreach NH_4-N nutrient budget

Month	in	WW	div	rtrn	ag	out	instr	net
SEP_05	36.41	0.11	34.47	2.45	-32.03	1.07	3.42	35.45
OCT_05	47.65	7.43	34.71			1.80		53.28
NOV_05	61.89	7.43	3.90			45.70		23.62
DEC_05	56.48	7.43	4.29			35.78		28.13
JAN_06	39.52	7.43	3.48			114.95		-68.00
FEB_06	75.29	1.57	3.09			8.57		68.29
MAR_06	62.39	7.43	44.25	2.99	-41.25	1.46	27.11	68.36
APR_06	123.40	7.43	86.67			8.19		122.63
MAY_06	67.58	1.79	41.60	1.69	-39.91	1.69	27.77	67.67
JUN_06		7.43		3.07				
JUL_06	218.28	14.41	166.66			15.55		217.13
AUG_06	27.53	9.53	18.68	7.63	-11.05	11.45	14.56	25.61
SEP_06	45.63	10.37	36.64	0.00	-36.64	0.00	19.36	55.99
OCT_06	17.25	12.76	6.67	9.15	2.48	0.00	32.49	30.01
NOV_06	73.27	5.84	0.00			25.61		53.51
DEC_06	75.10	2.73	0.00			21.86		55.97
JAN_07	16.72	13.03	0.00	0.00	0.00	0.00	29.75	29.75
FEB_07	53.41	9.22	14.54	16.51	1.97	0.00	64.60	62.63
MAR_07	162.95	0.52	35.78			585.00		-421.52
APR_07	114.16	12.89	57.04			7.15		119.90
MAY_07	204.67	4.50	28.50			2.89		206.29
JUN_07	40.91	7.43	31.51	4.28	-27.23	9.10	12.00	39.23
JUL_07		7.43						
AUG_07		7.43						
SEP_07		7.43						
OCT_07		7.43						
DEC_07		7.43						
JAN_08	149.23	12.16	0.00	2.60	2.60	0.00	163.99	161.39

Notes:
All values are in units of kg/day.
Red indicates months which were excluded due to unstable flow conditions during sampling.
Blanks are shown for values where insufficient data were collected.

Table C-3 Southern subreach NH_4-N nutrient budget

Month	in	div	rtrn	ag	out	instr	net
SEP_05	1.07	1.07			3.36		-2.29
OCT_05	1.80	1.80			0.00		1.80
NOV_05	45.70	0.00			0.00		45.70
DEC_05	35.78	0.00			31.70		4.08
JAN_06	114.95	0.00			22.98		91.97
FEB_06	8.57	0.00	2.47	2.47	15.23	-4.19	-6.66
MAR_06	1.46	1.46			3.88		-2.42
APR_06	8.19	2.90	0.00	-2.90	0.00	5.29	8.19
MAY_06	1.69	1.69	0.00	-1.69	0.00	0.00	1.69
JUN_06							
JUL_06	15.55	0.95	14.30	13.35	57.18	-28.28	-41.63
AUG_06	11.45	3.59	7.95	4.35	0.00	15.80	11.45
SEP_06	0.00	0.00	0.00	0.00	2.32	-2.32	-2.32
OCT_06	0.00	0.00	1.71	1.71	0.00	1.71	0.00
NOV_06	25.61	0.00	0.00	0.00	18.60	7.01	7.01
DEC_06	21.86	0.00	0.00	0.00	17.81	4.05	4.05
JAN_07	0.00	0.00	2.30	2.30	21.19	-18.89	-21.19
FEB_07	0.00	0.00	0.00	0.00	44.61	-44.61	-44.61
MAR_07	585.00	0.00	30.99	30.99	289.45	326.54	295.55
APR_07	7.15	1.07	3.48	2.41	0.00	9.56	7.15
MAY_07	2.89	2.89	0.00	-2.89	0.00	0.00	2.89
JUN_07	9.10	7.15			4.21		4.89
JUL_07							
AUG_07							
SEP_07							
OCT_07							
DEC_07							
JAN_08	0.00	0.00	3.07	3.07	11.30	-8.23	-11.30

Notes:
All values are in units of kg/day.
Red indicates months which were excluded due to unstable flow conditions during sampling.
Blanks are shown for values where insufficient data were collected.

Appendix D: Wastewater loads

Table D-1 Northern subreach wastewater loads

	Bernalillo			Rio Rancho			Albuquerque		
	NO3-N	SRP	NH4-N	NO3-N	SRP	NH4-N	NO3-N	SRP	NH4-N
SEP_05	18.16	3.90	0.15	138.25	39.54	0.41	935.95	990.66	31.36
OCT_05	1.74*	2.67*	18.52*	126.60*	37.91*	2.11*	915.62*	601.46*	74.44*
NOV_05	1.74*	2.67*	18.52*	126.60*	37.91*	2.11*	915.62*	601.46*	74.44*
DEC_05	1.74*	2.67*	18.52*	126.60*	37.91*	2.11*	915.62*	601.46*	74.44*
JAN_06	1.74*	2.67*	18.52*	126.60*	37.91*	2.11*	915.62*	601.46*	74.44*
FEB_06	2.18	0.90	8.60	98.46	27.64	2.27	512.83	463.42	55.95
MAR_06	1.74*	2.67*	18.52*	126.60*	37.91*	2.11*	915.62*	601.46*	74.44*
APR_06	1.74*	2.67*	18.52*	126.60*	37.91*	2.11*	915.62*	601.46*	74.44*
MAY_06	0.03	6.03	32.06	158.95	37.09	0.95	1184.62	575.53	65.25
JUN_06	0.03	5.99	18.52*	144.73	54.26	2.11*	902.13	730.11	74.44*
JUL_06	0.06	2.59	50.57	127.92	54.80	0.93	933.13	795.93	207.20
AUG_06	0.15	2.83	46.09	147.13	7.64	0.56	719.20	598.92	7.79
SEP_06	0.12	1.58	44.25	157.49	38.02	1.27	649.13	542.06	34.14
OCT_06	1.79	0.53	24.42	178.65	59.02	1.73	1007.12	809.15	8.20
NOV_06	2.74	0.12	3.50	235.70	41.42	5.81	1685.67	348.79	52.44
DEC_06	3.17	0.32	7.70	101.65	35.31	1.10	756.65	550.20	75.10
JAN_07	1.74*	2.67*	18.52*	117.63	35.25	0.63	692.88	629.82	5.98
FEB_07	0.94	0.06	7.37	92.93	55.19	3.97	476.61	544.92	48.75
MAR_07	1.04	0.16	8.61	118.51	49.67	1.71	1202.53	582.30	117.21
APR_07	1.23	5.28	2.10	102.34	36.08	1.24	750.73	507.79	105.50
MAY_07	0.72	1.57	8.54	97.14	30.02	1.42	1288.64	501.32	202.67
JUN_07	0.13	0.44	0.96	71.15	28.61	0.46	1407.06	386.44	36.00
JUL_07	0.11	1.70	18.52*	86.36	34.31	2.11*	1246.31	517.26	74.44*
AUG_07	0.11	5.38	18.52*	81.39	29.72	2.11*	775.30	634.12	74.44*
SEP_07	0.11	7.80	18.52*	132.59	45.30	2.11*	590.14	371.42	74.44*
OCT_07	0.40	8.23	18.52*	78.65	44.19	2.11*	908.61	843.25	74.44*
DEC_07	2.06	0.67	18.52*	140.84	2.45	2.11*	901.67	673.20	74.44*
JAN_08	1.16	0.00	32.88	176.76	48.48	9.28	616.65	635.59	137.49

<u>Notes:</u>
All values are in units of kg/day
* indicates sampling event where mean WWTP loading rates were used to estimate nutrient loading from one or more WWTPs.

Table D-2 Central subreach wastewater loads

	Los Lunas		
	NO3-N	SRP	NH4-N
SEP_05	47.61	12.39	0.11
OCT_05	53.29*	14.26*	7.43*
NOV_05	53.29*	14.26*	7.43*
DEC_05	53.29*	14.26*	7.43*
JAN_06	53.29*	14.26*	7.43*
FEB_06	38.78	9.05	1.57
MAR_06	53.29*	14.26*	7.43*
APR_06	53.29*	14.26*	7.43*
MAY_06	27.22	12.29	1.79
JUN_06	53.29*	14.26*	7.43*
JUL_06	21.27	21.45	14.41
AUG_06	13.02	5.77	9.53
SEP_06	91.27	20.75	10.37
OCT_06	45.77	16.63	12.76
NOV_06	56.46	10.43	5.84
DEC_06	82.68	12.18	2.73
JAN_07	98.07	14.28	13.03
FEB_07	56.67	14.12	9.22
MAR_07	68.79	17.07	0.52
APR_07	60.83	20.17	12.89
MAY_07	50.12	13.72	4.50
JUN_07	53.29*	14.26*	7.43*
JUL_07	24.84	12.63	7.43*
AUG_07	19.50	13.86	7.43*
SEP_07	53.29*	14.26*	7.43*
OCT_07	59.36	21.55	7.43*
DEC_07	83.32	10.11	7.43*
JAN_08	66.89	12.46	12.16

Notes:
All values are in units of kg/day
* indicates sampling event where mean WWTP loading rates were used to estimate nutrient loading from one or more WWTPs.

Appendix E: Sampling Results

Table E-1 Sampling Sites

Site Name	Site Abbrev.	Latitude	Longitude	Elevation	Type
RG_Buckman	RGBUCKMN	35.83628	-106.16099	1667	M
Cochiti_Main_Canal	COCHESMC	36.61751	-106.32216	1597	T
RG_Below_Cochiti	RGBLCOCH	36.61751	-106.32216	1597	M
Sili_Main_Canal	SMCCOCHT	36.61751	-106.32216	1597	T
Cochiti_Total	RGCOCHXS	36.61751	-106.32216	1597	.
RG_San_Felipe	SANFELIP	35.44457	-106.43983	1564	M
RG_Angostura	RGANGOST	35.38075	-106.50223	1546	M
Angostura_Diversion	ANGUSDIV	35.38075	-106.50223	1546	T
RG_Bernalillo_550	RGBER550	35.32151	-106.55782	1534	M
Bernalillo_WWTP	BERNWWTP	35.30766	-106.56195	1545	T
RG_Below_Bernalillo_WWTP	RGBERLWW	35.28114	-106.59857	1537	M
Sandia_Lakes_Wasteway	SANDLKWW	35.22618	-106.58929	1530	T
Rio_Rancho_WWTP	RIORWWTP	35.25973	-106.59632	1538	T
Alameda_Drain	ALMDRAIN	35.19863	-106.64364	1533	T
Upper_Corrales_Drain	UPCORDRN	35.19863	-106.64364	1533	T
RG_Below_RR_WWTP	RGRRWWTP	35.19695	-106.64145	1532	M
RG_Alameda	RGALAMED	35.15866	-106.6703	1519	M
LCRDR	LCRDRAIN	35.15866	-106.6703	1519	T
Corrales_Wasteway	CORALSWW	35.15866	-106.6703	1519	T
RG_at_LCRDR	RGLCRDR	35.15631	-106.67039	1518	M
Oxbow_Drain	OXBDRAIN	35.13625	-106.68955	1519	T
RG_at_LCRDR	RGLCRDR	35.13426	-106.68843	1518	M
RG_at_Oxbow	RGOXBOW	35.10596	-106.69257	1516	M
Central_Bridge_Drain	CENDRAIN	35.09618	-106.68861	1513	T
RG_at_Central_Br	RGCENTBR	35.08962	-106.68088	1510	M
RG_at_Rio_Bravo	RGRIOBRV	35.02703	-106.67358	1509	M
Albuqerque_WWTP	ABQCWWTP	35.01772	-106.67096	1505	T
Atrisco_Drain	ATRSCDRN	34.94986	-106.68499	1492	T
RG_Above_Isleta_(I_25)	RGABVISL	34.95018	-106.68237	1493	M
Albuquerque_Riverside_Drai	ABQRSDRN	34.95079	-106.67797	1490	T
Isleta_Diversion	ISLDIVER	34.90566	-106.68522	1490	T
RG_Below_Isleta	RGBELISL	34.86662	-106.72117	1485	M
RG_LL_Bridge	RGLLBRDG	34.80542	-106.71632	1481	M
LL_WWTP	LOSLWWTP	34.78048	-106.73059	1479	T
RG_Below_LL_WWTP	RGLLWWTP	34.69184	-106.7447	1462	M
Peralta Wasteway	PERALTWW	34.69094	-106.74366	1468	T
Peralta Wasteway	PERTWASW	34.69094	-106.74366	1468	T

Site Name	Site Abbrev.	Latitude	Longitude	Elevation	Type
LPDR1	LPDR1DRN	34.65705	-106.73882	1466	T
Belen_Drain	BELENDRN	34.63132	-106.74832	1462	T
RG_Belen_Bridge	RGBLENBR	34.65308	-106.73824	1467	M
LPDR2	LPDR2DRN	34.59055	-106.75024	1451	T
RG_Belen_Bridge	RGBLENBR	34.59099	-106.75072	1452	M
RG_Belen_Tower_Site	RGBLENTW	34.54567	-106.76411	1452	M
Rio_Puerco	RIOPUERC	34.40933	-106.85319	1442	T
Sabinal_Drain	SABDRAIN	34.37433	-106.84072	1435	T
SanFrancisco_Drain	SFRANDRN	34.37433	-106.84072	1435	T
L_&_J_Drain	LNJDRAIN	34.37091	-106.83828	1436	T
RG_Below_San_F	RGBLSANF	34.30896	-106.85182	1430	M
Unit_7_Drain	UNITSVDR	34.25718	-106.88716	1423	T
Socorro_Main_Canal	SOCOROMC	34.25718	-106.88716	1423	T
San_Acacia_Diversion	SANADIVR	34.25595	-106.88853	1419	T
RG_San_Acacia	RGACACIA	34.25595	-106.88853	1419	M
LFCC_at_NCP	LFCCLNCP	33.95573	-106.85242	1392	T
RG_at_NCP	RGATNCP	33.95586	-106.85122	1393	M
LFCC_at_NB_Gate_BD	LFCCNGBD	33.873	-106.85081	1384	T
RG_NB_GATE_BD	RGNBGTBD	33.87251	-106.84943	1386	M
LFCC_at_SB_Gate_BD	LFCCSGBD	33.72403	-106.91438	1372	T
RG_SB_GATE_BD	RGSBGTBD	33.72144	-106.91247	1376	M
Bosque_Del_Apache_Drain	BDLDRAIN	33.7151	-106.94743	1371	T
LFCC_at_ST_PK_Gate	LFCCSTPK	33.63031	-107.00327	1364	T
RG_at_ST_PK_Gate	RGSTPKGT	33.57885	-107.06477	1351	M
Rock_House	ROCKHOUS	33.38349	-107.1631	1334	M
Elephant_Butte	ELEBUTTE	33.14871	-107.21637	1295	M

Notes: Type – Main Channel (M) or Tributary (T)

Table E-2 Sampling Results September 2005 (SEP05)

Site Abbrev.	Month ID	Date	Time	NH4-N	NO3-N	SRP
RGBER550	SEP05	19-Sep-05	15:00	0.00	0.00	0.04
BERNWWTP	SEP05	19-Sep-05	15:05	62.61	7.75	1.66
RGBERLWW	SEP05	19-Sep-05	14:10	0.00	0.01	0.08
RIORWWTP	SEP05	21-Sep-05		34.19	11.53	3.30
RGRRWWTP	SEP05	18-Sep-05		0.00	0.71	0.21
ALMDRAIN	SEP05	18-Sep-05	18:15	0.00	0.00	0.01
RGALAMED	SEP05	18-Sep-05	18:00	16.39	0.06	0.04
LCRDRAIN	SEP05	18-Sep-05	17:20	0.00	0.00	0.04
RGLCRDR	SEP05	18-Sep-05	17:00	5.00	0.24	0.10
OXBDRAIN	SEP05	18-Sep-05	16:20	5.00	0.00	0.01
RGOXBOW	SEP05	18-Sep-05	16:10	5.00	0.03	0.02
CENDRAIN	SEP05	18-Sep-05	14:50	0.00	0.01	0.02
RGCENTBR	SEP05	18-Sep-05	15:30	0.00	0.07	0.05
ABQCWWTP	SEP05	18-Sep-05	14:00	147.80	4.41	4.67
ATRSCDRN	SEP05	18-Sep-05	13:05	26.66	0.21	0.14
RGABVISL	SEP05	18-Sep-05	13:44	68.94	1.90	1.73
ABQRSDRN	SEP05	18-Sep-05	12:45	19.18	0.14	0.09
RGBELISL	SEP05	18-Sep-05	11:35	5.00	1.65	0.79
LOSLWWTP	SEP05	18-Sep-05	10:30	33.73	14.97	3.90
RGLLWWTP	SEP05	18-Sep-05	10:45	6.14	1.76	0.65
PERALTWW	SEP05	18-Sep-05	9:10	8.60	1.80	0.61
LPDR1DRN	SEP05	18-Sep-05	8:40	66.82	0.34	0.25
RGBLENBR	SEP05	18-Sep-05	8:28	9.60	0.94	0.43
LPDR2DRN	SEP05	17-Sep-05	17:33	11.85	0.95	0.33
RGBLENTW	SEP05	17-Sep-05	17:50	5.00	0.33	0.23
RIOPUERC	SEP05	17-Sep-05	14:56	0.00	0.49	0.02
SFRANDRN	SEP05	17-Sep-05	16:42	56.90	0.32	0.07
LNJDRAIN	SEP05	17-Sep-05	16:20	5.00	0.94	0.31
RGBLSANF	SEP05	17-Sep-05	16:00	0.00	0.65	0.26
RGACACIA	SEP05	17-Sep-05	14:24	0.00	0.69	0.25
LFCCLNCP	SEP05	17-Sep-05	13:30	5.00	0.01	0.19
LFCCNGBD	SEP05	17-Sep-05	12:51	29.79	0.02	0.15
RGNBGTBD	SEP05	17-Sep-05	10:50	6.51	0.26	0.13
LFCCSGBD	SEP05	17-Sep-05	12:05	27.79	0.07	0.10
RGSBGTBD	SEP05	17-Sep-05	12:35	5.00	0.24	0.18
LFCCSTPK	SEP05	17-Sep-05	9:50	.	0.25	0.11
RGSTPKGT	SEP05	17-Sep-05	10:20	5.00	0.21	0.11
ROCKHOUS	SEP05	17-Sep-05	8:15	12.14	0.27	0.06

Units: NH_4-N – µg/L, NO_3-N – mg/L, SRP – mg/L

Table E-3 Sampling Results October 2005 (OCT05)

Site Abbrev.	Month ID	Date	Time	NH4-N	NO3-N	SRP
RGBUCKMN	OCT05	28-Oct-05	16:20	0.00	0.01	0.01
RGANGOST	OCT05	28-Oct-05	18:10	0.00	0.01	0.00
RGBER550	OCT05	29-Oct-05	8:00	0.00	0.00	0.01
RGBERLWW	OCT05	29-Oct-05	8:45	0.00	0.02	0.01
RGRRWWTP	OCT05	29-Oct-05	9:20	0.00	0.45	0.13
RGALAMED	OCT05	29-Oct-05	9:35	0.00	0.05	0.02
RGLCRDR	OCT05	29-Oct-05	11:25	0.00	0.07	0.03
RGOXBOW	OCT05	29-Oct-05	12:45	0.00	0.08	0.03
RGCENTBR	OCT05	29-Oct-05	14:35	0.00	0.09	0.03
RGABVISL	OCT05	29-Oct-05	16:25	33.93	1.58	0.54
RGBELISL	OCT05	29-Oct-05	17:30	0.00	1.66	0.49
RGLLWWTP	OCT05	29-Oct-05	18:20	18.95	2.04	0.66
RGBLENBR	OCT05	30-Oct-05	16:50	.	1.14	0.41
RGBLENTW	OCT05	30-Oct-05	16:15	0.00	1.55	0.46
RGBLSANF	OCT05	30-Oct-05	14:30	0.00	1.32	0.37
RGACACIA	OCT05	30-Oct-05	13:40	0.00	0.91	0.29
RGATNCP	OCT05	30-Oct-05	12:30	0.00	0.72	0.25
RGNBGTBD	OCT05	30-Oct-05	11:45	6.56	0.77	0.23
RGSBGTBD	OCT05	30-Oct-05	10:42	8.23	0.62	0.25
RGSTPKGT	OCT05	30-Oct-05	10:00	5.99	0.57	0.26
ROCKHOUS	OCT05	30-Oct-05	8:25	0.00	0.25	0.09

Units: NH_4-N – μg/L, NO_3-N – mg/L, SRP – mg/L

Table E-4 Sampling Results November 2005 (NOV05)

Site Abbrev.	Month ID	Date	Time	NH4-N	NO3-N	SRP
RGBUCKMN	NOV05	18-Nov-05	14:35	0.00	0.04	0.03
RGANGOST	NOV05	18-Nov-05	16:10	0.00	0.00	0.01
RGBER550	NOV05	18-Nov-05	16:40	0.00	0.00	0.01
RGBERLWW	NOV05	18-Nov-05	17:15	0.00	0.02	0.01
RGRRWWTP	NOV05	19-Nov-05	7:05	0.00	0.06	0.02
RGALAMED	NOV05	19-Nov-05	7:45	0.00	0.05	0.02
RGLCRDR	NOV05	19-Nov-05	8:15	0.00	0.08	0.02
RGOXBOW	NOV05	19-Nov-05	9:10	0.00	0.07	0.02
RGCENTBR	NOV05	19-Nov-05	10:55	0.00	0.08	0.02
RGABVISL	NOV05	19-Nov-05	12:30	0.00	0.28	0.08
RGBELISL	NOV05	19-Nov-05	13:10	24.35	0.86	0.25
RGLLWWTP	NOV05	19-Nov-05	14:15	19.38	1.13	0.28
RGBLENBR	NOV05	19-Nov-05	15:00	9.95	0.87	0.27
RGBLENTW	NOV05	19-Nov-05	15:40	0.00	0.55	0.21
RGBLSANF	NOV05	20-Nov-05	15:45	0.00	0.76	0.23
RGACACIA	NOV05	20-Nov-05	15:00	18.99	0.64	0.18
RGATNCP	NOV05	20-Nov-05	13:15	11.32	0.82	0.19
RGNBGTBD	NOV05	20-Nov-05	12:45	0.00	0.87	0.19
RGSBGTBD	NOV05	20-Nov-05	11:45	.	0.66	0.18
RGSTPKGT	NOV05	20-Nov-05	11:10	0.00	0.63	0.17
ROCKHOUS	NOV05	20-Nov-05	10:00	0.00	0.49	0.13

Units: NH_4-N – µg/L, NO_3-N – mg/L, SRP – mg/L

Table E-5 Sampling Results December 2005 (DEC05)

Site Abbrev.	Month ID	Date	Time	NH4-N	NO3-N	SRP
RGBUCKMN	DEC05	16-Dec-05	12:40	0.00	0.18	0.01
RGANGOST	DEC05	16-Dec-05	14:12	6.60	0.00	0.00
RGBER550	DEC05	16-Dec-05	14:50	0.00	0.00	0.00
RGBERLWW	DEC05	16-Dec-05	15:20	0.00	0.02	0.01
RGRRWWTP	DEC05	16-Dec-05	15:45	0.00	0.26	0.06
RGALAMED	DEC05	16-Dec-05	16:10	6.63	0.18	0.04
RGLCRDR	DEC05	16-Dec-05	16:50	5.29	0.15	0.05
RGOXBOW	DEC05	18-Dec-05	12:35	8.00	0.09	0.02
RGCENTBR	DEC05	18-Dec-05	13:05	9.02	0.11	0.03
RGABVISL	DEC05	18-Dec-05	14:15	19.63	0.35	0.20
RGBELISL	DEC05	17-Dec-05	16:30	27.38	0.56	0.27
RGLLWWTP	DEC05	17-Dec-05	15:55	28.56	0.94	0.33
RGBLENBR	DEC05	17-Dec-05	15:00	23.32	0.85	0.38
RGBLENTW	DEC05	17-Dec-05	13:40	16.48	0.53	0.27
RGBLSANF	DEC05	17-Dec-05	12:30	14.80	0.74	0.31
RGACACIA	DEC05	17-Dec-05	11:30	15.94	0.55	0.27
RGATNCP	DEC05	17-Dec-05	10:50	14.79	0.81	0.29
RGNBGTBD	DEC05	17-Dec-05	10:20	13.60	0.72	0.28
RGSBGTBD	DEC05	17-Dec-05	9:30	18.82	0.57	0.28
RGSTPKGT	DEC05	17-Dec-05	8:50	19.71	0.74	0.31
ROCKHOUS	DEC05	17-Dec-05	7:40	19.07	0.54	0.22

Units: NH_4-N – μg/L, NO_3-N – mg/L, SRP – mg/L

Table E-6 Sampling Results January 2006 (JAN06)

Site Abbrev.	Month ID	Date	Time	NH4-N	NO3-N	SRP
RGBUCKMN	JAN06	13-Jan-06	8:30	8.73	0.14	0.01
RGANGOST	JAN06	13-Jan-06	9:15	0.00	0.09	0.02
RGBER550	JAN06	13-Jan-06	9:45	0.00	0.00	0.00
RGBERLWW	JAN06	13-Jan-06	10:15	11.12	0.00	0.01
RGRRWWTP	JAN06	13-Jan-06	10:50	15.92	0.38	0.09
RGALAMED	JAN06	13-Jan-06	11:10	7.97	0.05	0.02
RGLCRDR	JAN06	13-Jan-06	12:05	8.12	0.04	0.02
RGOXBOW	JAN06	13-Jan-06	13:01	6.57	0.06	0.02
RGCENTBR	JAN06	13-Jan-06	13:30	6.60	0.07	0.02
RGABVISL	JAN06	13-Jan-06	15:00	58.03	0.84	0.16
RGBELISL	JAN06	14-Jan-06	16:00	52.20	0.83	0.26
RGLLWWTP	JAN06	14-Jan-06	15:35	76.35	1.31	0.30
RGBLENBR	JAN06	14-Jan-06	14:40	95.10	1.04	0.22
RGBLENTW	JAN06	14-Jan-06	14:10	84.61	0.58	0.17
RGBLSANF	JAN06	14-Jan-06	13:30	96.31	0.92	0.19
RGACACIA	JAN06	14-Jan-06	13:01	77.59	0.61	0.24
RGATNCP	JAN06	14-Jan-06	11:15	7.54	0.43	0.40
RGNBGTBD	JAN06	14-Jan-06	11:00	7.38	0.50	0.26
RGSBGTBD	JAN06	14-Jan-06	10:05	11.36	0.68	0.27
RGSTPKGT	JAN06	14-Jan-06	9:40	12.13	0.79	0.27
ROCKHOUS	JAN06	14-Jan-06	8:35	12.11	0.41	0.18

Units: NH_4-N – μg/L, NO_3-N – mg/L, SRP – mg/L

Table E-7 Sampling Results February 2006 (FEB06)

Site Abbrev.	Month ID	Date	Time	NH4-N	NO3-N	SRP
RGBUCKMN	FEB06	9-Feb-06	12:00	16.55	0.17	0.01
RGANGOST	FEB06	9-Feb-06	13:30	6.29	0.01	0.00
RGBER550	FEB06	9-Feb-06	14:00	0.00	0.00	0.00
BERNWWTP	FEB06	9-Feb-06	14:35	4357.95	1.11	0.46
RGBERLWW	FEB06	9-Feb-06	15:35	62.81	0.00	0.00
RIORWWTP	FEB06	9-Feb-06	16:00	188.36	8.16	2.29
ALMDRAIN	FEB06	9-Feb-06	16:40	6.14	0.01	0.05
RGRRWWTP	FEB06	9-Feb-06	16:35	16.36	0.16	0.04
RGALAMED	FEB06	9-Feb-06	17:20	5.96	0.15	0.04
OXBDRAIN	FEB06	9-Feb-06	17:30	7.70	0.00	0.02
RGOXBOW	FEB06	10-Feb-06	7:30	0.00	0.12	0.03
CENDRAIN	FEB06	10-Feb-06	7:40	0.00	0.03	0.02
RGCENTBR	FEB06	10-Feb-06	8:00	0.00	0.11	0.03
ABQCWWTP	FEB06	10-Feb-06	8:30	293.26	2.69	2.43
ATRSCDRN	FEB06	10-Feb-06	9:15	207.08	0.26	0.23
RGABVISL	FEB06	10-Feb-06	9:20	31.57	0.57	0.51
ABQRSDRN	FEB06	10-Feb-06	9:10	28.10	0.09	0.08
RGBELISL	FEB06	10-Feb-06	11:00	21.87	0.61	0.51
LOSLWWTP	FEB06	10-Feb-06	12:30	556.54	13.75	3.21
RGLLWWTP	FEB06	10-Feb-06	13:30	12.47	0.63	0.48
LPDR1DRN	FEB06	10-Feb-06	14:15	40.00	0.14	0.17
RGBLENBR	FEB06	10-Feb-06	14:10	9.54	0.47	0.36
RGBLENTW	FEB06	10-Feb-06	15:00	9.48	0.45	0.32
RIOPUERC	FEB06	11-Feb-06	14:35	0.00	0.50	0.00
SFRANDRN	FEB06	11-Feb-06	15:35	10.55	0.13	0.05
RGBLSANF	FEB06	11-Feb-06	15:20	0.00	0.54	0.35
RGACACIA	FEB06	11-Feb-06	14:10	5.29	0.41	0.30
LFCCLNCP	FEB06	11-Feb-06	12:50	25.98	0.10	0.06
RGATNCP	FEB06	11-Feb-06	12:45	0.00	0.62	0.30
LFCCNGBD	FEB06	11-Feb-06	12:20	11.47	0.02	0.04
RGNBGTBD	FEB06	11-Feb-06	12:10	0.00	0.48	0.27
LFCCSGBD	FEB06	11-Feb-06	11:25	10.33	1.17	0.03
RGSBGTBD	FEB06	11-Feb-06	11:15	7.75	0.64	0.36
LFCCSTPK	FEB06	11-Feb-06	10:55	5.47	0.73	0.09
RGSTPKGT	FEB06	11-Feb-06	10:35	6.97	0.61	0.31
ROCKHOUS	FEB06	11-Feb-06	9:20	10.04	0.38	0.12

Units: NH_4-N – μg/L, NO_3-N – mg/L, SRP – mg/L

Table E-8 Sampling Results March 2006 (MAR06)

Site Abbrev.	Month ID	Date	Time	NH4-N	NO3-N	SRP
RGBUCKMN	MAR06	24-Mar-06	9:10	7.07	0.04	0.01
RGANGOST	MAR06	24-Mar-06	10:30	0.00	0.00	0.01
RGBER550	MAR06	24-Mar-06	11:05	0.00	0.00	0.00
RGBERLWW	MAR06	24-Mar-06	11:30	0.00	0.01	0.00
RGRRWWTP	MAR06	24-Mar-06	12:00	0.00	0.12	0.03
RGALAMED	MAR06	24-Mar-06	13:10	5.23	0.03	0.01
RGLCRDR	MAR06	24-Mar-06	13:45	5.36	0.04	0.02
RGOXBOW	MAR06	24-Mar-06	14:40	4.79	0.08	0.03
RGCENTBR	MAR06	24-Mar-06	14:50	4.10	0.10	0.01
RGABVISL	MAR06	24-Mar-06	15:30	17.91	0.54	0.30
RGBELISL	MAR06	24-Mar-06	16:20	20.18	1.14	0.57
RGLLWWTP	MAR06	26-Mar-06	14:40	13.14	1.46	0.72
RGBLENBR	MAR06	26-Mar-06	14:00	0.00	0.77	0.58
RGBLENTW	MAR06	26-Mar-06	13:40	0.00	0.67	0.50
RGBLSANF	MAR06	25-Mar-06	16:30	0.00	0.53	0.29
RGACACIA	MAR06	25-Mar-06	14:15	0.00	0.39	0.29
RGATNCP	MAR06	25-Mar-06	13:10	0.00	0.21	0.27
RGNBGTBD	MAR06	25-Mar-06	12:25	0.00	0.16	0.25
RGSBGTBD	MAR06	25-Mar-06	11:40	0.00	0.02	0.28
RGSTPKGT	MAR06	25-Mar-06	11:00	0.00	0.00	0.15
ROCKHOUS	MAR06	25-Mar-06	10:52	7.38	0.05	0.06
ELEBUTTE	MAR06	25-Mar-06	9:00	15.26	0.13	0.02

Units: NH_4-N – μg/L, NO_3-N – mg/L, SRP – mg/L

Table E-9 Sampling Results April 2006 (APR06)

Site Abbrev.	Month ID	Date	Time	NH4-N	NO3-N	SRP
RGBUCKMN	APR06	30-Apr-06	8:30	0.00	0.04	0.01
RGANGOST	APR06	30-Apr-06	9:45	0.00	0.00	0.01
RGBER550	APR06	30-Apr-06	10:15	0.00	0.00	0.01
RGBERLWW	APR06	30-Apr-06	10:40	0.00	0.01	0.01
RGRRWWTP	APR06	30-Apr-06	11:15	0.00	0.02	0.01
RGALAMED	APR06	30-Apr-06	12:20	0.00	0.02	0.03
RGOXBOW	APR06	30-Apr-06	13:00	0.00	0.06	0.02
RGCENTBR	APR06	30-Apr-06	13:20	0.00	0.07	0.03
RGRIOBRV	APR06	30-Apr-06	13:55	0.00	0.11	0.03
RGABVISL	APR06	30-Apr-06	14:10	0.00	0.24	0.12
RGBELISL	APR06	29-Apr-06	18:30	0.00	0.64	0.30
RGLLBRDG	APR06	29-Apr-06	18:00	.	0.89	0.42
RGLLWWTP	APR06	29-Apr-06	17:15	0.00	0.77	0.50
RGBLENBR	APR06	29-Apr-06	16:45	0.00	0.62	0.39
RGBLENTW	APR06	29-Apr-06	16:30	0.00	0.92	0.49
RGBLSANF	APR06	29-Apr-06	15:30	5.62	0.63	0.26
RGACACIA	APR06	29-Apr-06	15:00	12.49	0.41	0.29
RGATNCP	APR06	29-Apr-06	13:35	0.00	0.19	0.28
RGNBGTBD	APR06	29-Apr-06	13:10	.	0.08	0.24
RGSBGTBD	APR06	29-Apr-06	12:35	7.71	0.02	0.13
LFCCSTPK	APR06	29-Apr-06	12:15	0.00	0.11	0.10
RGSTPKGT	APR06	29-Apr-06	11:50	5.96	0.05	0.04
ROCKHOUS	APR06	29-Apr-06	10:45	0.00	0.09	0.06
ELEBUTTE	APR06	29-Apr-06	9:45	36.23	0.05	0.01

Units: NH_4-N – μg/L, NO_3-N – mg/L, SRP – mg/L

Table E-10 Sampling Results May 2006 (MAY06)

Site Abbrev.	Month ID	Date	Time	NH4-N	NO3-N	SRP
RGBUCKMN	MAY06	26-May-06	9:15	0.00	0.00	0.01
RGANGOST	MAY06	26-May-06	10:20	0.00	0.00	0.01
RGBER550	MAY06	26-May-06	11:10	0.00	0.00	0.01
BERNWWTP	MAY06	26-May-06	11:50	15846.73	0.01	2.98
RGBERLWW	MAY06	26-May-06	12:30	0.00	0.01	0.03
RIORWWTP	MAY06	26-May-06	12:50	88.96	14.93	3.48
ALMDRAIN	MAY06	26-May-06	13:50	0.00	0.00	0.04
RGRRWWTP	MAY06	26-May-06	13:45	0.00	0.16	0.05
RGALAMED	MAY06	26-May-06	14:20	0.00	0.07	0.03
LCRDRAIN	MAY06	26-May-06	14:30	0.00	0.00	0.01
OXBDRAIN	MAY06	26-May-06	15:45	0.00	0.00	0.02
RGLCRDR	MAY06	26-May-06	15:40	0.00	0.03	0.02
RGOXBOW	MAY06	26-May-06	16:20	0.00	0.03	0.03
CENDRAIN	MAY06	26-May-06	16:45	0.00	0.01	0.02
RGCENTBR	MAY06	26-May-06	17:00	0.00	0.03	0.03
RGRIOBRV	MAY06	26-May-06	17:30	0.00	0.09	0.03
ABQCWWTP	MAY06	26-May-06	18:00	326.73	5.93	2.88
ATRSCDRN	MAY06	28-May-06	15:10	0.00	0.03	0.11
RGABVISL	MAY06	28-May-06	15:20	0.00	0.17	0.11
ABQRSDRN	MAY06	28-May-06	15:30	17.20	0.23	0.23
RGBELISL	MAY06	28-May-06	14:45	0.00	0.41	0.34
RGLLBRDG	MAY06	28-May-06	14:00	0.00	0.55	0.39
LOSLWWTP	MAY06	28-May-06	13:40	462.47	7.05	3.18
RGLLWWTP	MAY06	27-May-06	20:20	0.00	0.79	0.49
LPDR1DRN	MAY06	27-May-06	20:00	0.00	0.28	0.26
LPDR2DRN	MAY06	27-May-06	19:40	0.00	0.40	0.31
RGBLENBR	MAY06	27-May-06	19:50	0.00	0.50	0.43
RGBLENTW	MAY06	27-May-06	19:00	0.00	0.49	0.45
SFRANDRN	MAY06	27-May-06	17:20	0.00	0.00	0.06
LNJDRAIN	MAY06	27-May-06	17:50	0.00	0.22	0.25
RGBLSANF	MAY06	27-May-06	17:10	0.00	0.27	0.31
RGACACIA	MAY06	27-May-06	16:00	0.00	0.02	0.57
LFCCLNCP	MAY06	27-May-06	14:45	0.00	0.00	0.13
RGATNCP	MAY06	27-May-06	14:40	0.00	0.09	0.23
LFCCNGBD	MAY06	27-May-06	14:15	0.00	0.00	0.05
RGNBGTBD	MAY06	27-May-06	14:05	0.00	0.08	0.16
LFCCSGBD	MAY06	27-May-06	13:05	22.29	0.01	0.05
RGSBGTBD	MAY06	27-May-06	12:55	0.00	0.00	0.11
LFCCSTPK	MAY06	27-May-06	12:20	0.00	0.06	0.08
RGSTPKGT	MAY06	27-May-06	12:00	0.00	0.01	0.07
ROCKHOUS	MAY06	27-May-06	11:10	0.00	0.18	0.06
ELEBUTTE	MAY06	27-May-06	10:30	0.00	0.14	0.06

Units: NH_4-N – μg/L, NO_3-N – mg/L, SRP – mg/L

Table E-11 Sampling Results June 2006 (JUN06)

Site Abbrev.	Month	Date	Time	NH4-N	NO3-N	SRP
RGBUCKMN	JUN06	26-Jun-06	7:00	.	0.01	0.01
RGANGOST	JUN06	26-Jun-06	8:45	.	0.03	0.02
RGBER550	JUN06	26-Jun-06	9:20	.	0.01	0.01
BERNWWTP	JUN06	26-Jun-06	9:35	.	0.01	2.34
RGBERLWW	JUN06	26-Jun-06	10:00	.	0.01	0.04
RIORWWTP	JUN06	26-Jun-06	10:20	.	11.64	4.36
RGRRWWTP	JUN06	26-Jun-06	10:45	.	0.01	0.03
RGALAMED	JUN06	26-Jun-06	12:20	.	0.01	0.02
RGOXBOW	JUN06	26-Jun-06	13:15	.	0.03	0.03
RGRIOBRV	JUN06	26-Jun-06	14:20	.	0.08	0.03
ABQCWWTP	JUN06	26-Jun-06	14:40	.	4.44	3.60
ABQRSDRN	JUN06	26-Jun-06	15:30	.	0.24	0.33
LFCCSTPK	JUN06	27-Jun-06	12:45	.	0.01	0.10
RGSTPKGT	JUN06	27-Jun-06	12:20	.	0.00	0.08
ROCKHOUS	JUN06	27-Jun-06	11:15	.	0.06	0.06
ELEBUTTE	JUN06	27-Jun-06	9:45	.	0.08	0.13

Units: NH_4-N – μg/L, NO_3-N – mg/L, SRP – mg/L

Table E-12 Sampling Results July 2006 (JUL06)

Site Abbrev.	Month ID	Date	Time	NH4-N	NO3-N	SRP
RGBUCKMN	JUL06	14-Jul-06	10:07	6.68	0.00	0.00
RGANGOST	JUL06	14-Jul-06	11:20	8.05	0.03	0.02
RGBER550	JUL06	14-Jul-06	12:25	6.81	0.02	0.01
BERNWWTP	JUL06	14-Jul-06	12:55	18631.27	0.02	0.95
RGBERLWW	JUL06	14-Jul-06	13:05	14.47	0.02	0.06
RIORWWTP	JUL06	14-Jul-06	13:20	98.04	13.43	5.75
RGRRWWTP	JUL06	14-Jul-06	14:00	6.62	0.14	0.07
RGALAMED	JUL06	14-Jul-06	15:15	5.68	0.05	0.03
RGOXBOW	JUL06	14-Jul-06	16:10	5.46	0.06	0.04
RGCENTBR	JUL06	14-Jul-06	16:30	6.81	0.08	0.08
RGRIOBRV	JUL06	14-Jul-06	17:37	5.09	0.18	0.07
ABQCWWTP	JUL06	14-Jul-06	17:58	972.56	4.38	3.74
ATRSCDRN	JUL06	14-Jul-06	18:30	39.44	0.05	0.15
RGABVISL	JUL06	14-Jul-06	18:40	14.42	0.95	0.75
ABQRSDRN	JUL06	14-Jul-06	18:45	5.18	0.20	0.30
RGBELISL	JUL06	14-Jul-06	19:25	0.00	0.55	0.45
RGLLBRDG	JUL06	15-Jul-06	17:45	5.78	1.01	0.60
LOSLWWTP	JUL06	15-Jul-06	17:27	3171.29	4.68	4.72
RGLLWWTP	JUL06	15-Jul-06	16:40	13.52	1.01	0.64
RGBLENBR	JUL06	15-Jul-06	16:10	5.16	0.68	0.53
RGBLENTW	JUL06	15-Jul-06	15:45	8.45	0.61	0.40
LNJDRAIN	JUL06	15-Jul-06	14:25	15.70	0.44	0.25
RGBLSANF	JUL06	15-Jul-06	14:55	17.29	0.55	0.25
UNITSVDR	JUL06	15-Jul-06	13:10	0.00	0.61	0.24
RGACACIA	JUL06	15-Jul-06	13:05	18.65	0.72	0.23
RGATNCP	JUL06	15-Jul-06	12:25	5.21	0.88	0.12
RGSBGTBD	JUL06	15-Jul-06	11:35	7.83	1.24	0.05
LFCCSTPK	JUL06	15-Jul-06	11:10	19.45	0.24	0.15
RGSTPKGT	JUL06	15-Jul-06	10:50	9.37	1.41	0.00
ROCKHOUS	JUL06	15-Jul-06	9:15	23.20	0.88	0.08
ELEBUTTE	JUL06	15-Jul-06	8:30	14.45	0.09	0.00

Units: NH_4-N – μg/L, NO_3-N – mg/L, SRP – mg/L

Table E-13 Sampling Results August 2006 (AUG06)

Site Abbrev.	Month ID	Date	Time	NH4-N	NO3-N	SRP
RGBUCKMN	AUG06	3-Sep-06	8:30	0.00	0.02	0.05
RGANGOST	AUG06	3-Sep-06	9:30	6.60	0.04	0.04
RGBER550	AUG06	3-Sep-06	9:55	6.13	0.02	0.04
BERNWWTP	AUG06	3-Sep-06	10:10	17852.73	0.06	1.10
RGBERLWW	AUG06	3-Sep-06	11:00	40.25	0.02	0.04
RIORWWTP	AUG06	3-Sep-06	11:30	61.37	16.14	0.84
ALMDRAIN	AUG06	3-Sep-06	11:45	9.72	0.02	0.03
RGRRWWTP	AUG06	3-Sep-06	12:00	5.98	0.03	0.04
RGALAMED	AUG06	3-Sep-06	12:45	6.11	0.04	0.05
RGOXBOW	AUG06	3-Sep-06	13:15	51.73	0.01	0.03
RGCENTBR	AUG06	3-Sep-06	13:40	7.95	0.13	0.06
RGRIOBRV	AUG06	3-Sep-06	14:45	10.65	0.18	0.06
ABQCWWTP	AUG06	3-Sep-06	14:20	37.61	3.47	2.89
ATRSCDRN	AUG06	3-Sep-06	15:30	12.92	0.08	0.11
RGABVISL	AUG06	3-Sep-06	15:20	23.21	0.65	0.38
ABQRSDRN	AUG06	3-Sep-06	15:00	37.48	0.11	0.12
RGBELISL	AUG06	3-Sep-06	16:00	5.71	1.06	0.43
RGLLBRDG	AUG06	3-Sep-06	16:40	35.87	1.31	0.44
LOSLWWTP	AUG06	3-Sep-06	16:50	2480.11	3.39	1.50
RGLLWWTP	AUG06	3-Sep-06	18:00	16.32	1.16	0.39
LPDR1DRN	AUG06	3-Sep-06	19:00	11.30	0.64	0.25
RGBLENBR	AUG06	3-Sep-06	17:30	49.58	0.16	0.06
LPDR2DRN	AUG06	4-Sep-06	8:10	15.72	0.39	0.08
RGBLENTW	AUG06	4-Sep-06	8:20	8.05	0.28	0.10
RIOPUERC	AUG06	4-Sep-06	11:15	0.00	0.00	0.00
SFRANDRN	AUG06	4-Sep-06	8:55	0.00	0.02	0.00
LNJDRAIN	AUG06	4-Sep-06	9:10	11.89	0.31	0.09
RGBLSANF	AUG06	4-Sep-06	10:45	0.00	0.26	0.10
UNITSVDR	AUG06	4-Sep-06	11:45	9.40	0.13	0.05
RGACACIA	AUG06	4-Sep-06	11:30	8.84	0.32	0.07
LFCCSTPK	AUG06	4-Sep-06	15:00	9.71	0.33	0.10
RGSTPKGT	AUG06	4-Sep-06	14:46	0.00	1.07	0.06
ROCKHOUS	AUG06	4-Sep-06	16:00	0.00	0.39	0.07

Units: NH_4-N – µg/L, NO_3-N – mg/L, SRP – mg/L

Table E-14 Sampling Results September 2006 (SEP06)

Site Abbrev.	Month ID	Date	Time	NH4-N	NO3-N	SRP
RGBUCKMN	SEP06	29-Sep-06	19:30	7.20	0.00	0.01
RGANGOST	SEP06	30-Sep-06	8:00	0.00	0.00	0.02
RGBER550	SEP06	30-Sep-06	8:50	0.00	0.01	0.03
BERNWWTP	SEP06	30-Sep-06	9:10	17683.88	0.05	0.63
RGBERLWW	SEP06	30-Sep-06	9:30	0.00	0.01	0.05
RIORWWTP	SEP06	30-Sep-06	9:50	114.65	14.25	3.44
RGRRWWTP	SEP06	30-Sep-06	10:45	0.00	0.03	0.03
RGALAMED	SEP06	30-Sep-06	11:10	0.00	0.04	0.03
RGOXBOW	SEP06	30-Sep-06	11:40	0.00	0.11	0.07
RGRIOBRV	SEP06	30-Sep-06	13:05	6.24	0.13	0.05
ABQCWWTP	SEP06	30-Sep-06	13:20	162.60	3.09	2.58
ATRSCDRN	SEP06	30-Sep-06	14:10	0.00	0.15	0.12
RGABVISL	SEP06	30-Sep-06	13:55	0.00	0.42	0.25
ABQRSDRN	SEP06	30-Sep-06	13:45	27.49	0.16	0.18
RGBELISL	SEP06	30-Sep-06	14:35	0.00	0.68	0.42
RGLLBRDG	SEP06	30-Sep-06	15:30	0.00	0.83	0.42
LOSLWWTP	SEP06	30-Sep-06	15:45	2489.61	21.92	4.98
RGBLENBR	SEP06	30-Sep-06	16:10	0.00	0.20	0.25
RGBLENTW	SEP06	30-Sep-06	17:30	0.00	0.35	0.23
LNJDRAIN	SEP06	1-Oct-06	15:35	0.00	0.65	0.25
RGBLSANF	SEP06	1-Oct-06	16:00	0.00	0.63	0.25
UNITSVDR	SEP06	1-Oct-06	14:30	0.00	0.51	0.22
RGACACIA	SEP06	1-Oct-06	14:10	0.00	0.31	0.20
RGATNCP	SEP06	1-Oct-06	13:00	0.00	0.41	0.18
LFCCSTPK	SEP06	1-Oct-06	11:25	0.00	0.23	0.12
RGSTPKGT	SEP06	1-Oct-06	11:10	5.39	0.00	0.04
ROCKHOUS	SEP06	1-Oct-06	9:45	6.88	0.13	0.08

Units: NH_4-N – µg/L, NO_3-N – mg/L, SRP – mg/L

Table E-15 Sampling Results October 2006 (OCT06)

Site Abbrev.	Month ID	Date	Time	NH4-N	NO3-N	SRP
RGBUCKMN	OCT06	27-Oct-06	18:15	0.00	0.10	0.03
RGANGOST	OCT06	27-Oct-06	19:15	0.00	0.02	0.02
RGBER550	OCT06	28-Oct-06	10:30	0.00	0.02	0.03
BERNWWTP	OCT06	28-Oct-06	10:50	9321.32	0.68	0.20
RGBERLWW	OCT06	28-Oct-06	11:30	10.08	0.02	0.04
RIORWWTP	OCT06	28-Oct-06	11:45	113.04	11.64	3.85
ALMDRAIN	OCT06	28-Oct-06	12:30	0.00	0.01	0.05
RGRRWWTP	OCT06	28-Oct-06	12:40	0.00	0.10	0.06
RGALAMED	OCT06	28-Oct-06	13:25	0.00	0.04	0.02
OXBDRAIN	OCT06	28-Oct-06	14:00	0.00	0.01	0.01
RGOXBOW	OCT06	28-Oct-06	14:40	0.00	0.04	0.04
CENDRAIN	OCT06	28-Oct-06	14:55	0.00	0.02	0.02
RGRIOBRV	OCT06	28-Oct-06	15:20	0.00	0.11	0.04
ABQCWWTP	OCT06	28-Oct-06	15:40	38.45	4.72	3.79
ATRSCDRN	OCT06	28-Oct-06	17:00	0.00	0.09	0.09
RGABVISL	OCT06	28-Oct-06	16:40	12.69	0.24	0.13
ABQRSDRN	OCT06	28-Oct-06	16:00	42.30	0.13	0.16
RGBELISL	OCT06	28-Oct-06	17:20	22.23	0.35	0.19
RGLLBRDG	OCT06	28-Oct-06	18:00	45.52	0.49	0.25
LOSLWWTP	OCT06	28-Oct-06	18:20	2982.95	10.70	3.89
RGLLWWTP	OCT06	29-Oct-07	17:35	5.56	0.73	0.37
PERALTWW	OCT06	29-Oct-07	18:10	39.12	0.74	0.35
LPDR1DRN	OCT06	29-Oct-07	18:40	0.00	0.41	0.21
RGBLENBR	OCT06	29-Oct-07	18:50	0.00	0.75	0.38
RGBLENTW	OCT06	29-Oct-07	17:10	8.99	0.55	0.29
RIOPUERC	OCT06	29-Oct-07	14:40	0.00	0.42	0.00
SFRANDRN	OCT06	29-Oct-07	15:25	76.77	0.22	0.00
LNJDRAIN	OCT06	29-Oct-07	16:05	5.23	0.46	0.38
RGBLSANF	OCT06	29-Oct-07	16:30	0.00	0.61	0.29
UNITSVDR	OCT06	29-Oct-07	14:00	0.00	0.67	0.29
RGACACIA	OCT06	29-Oct-07	14:10	0.00	0.65	0.30
RGATNCP	OCT06	29-Oct-07	12:55	9.15	0.65	0.30
LFCCNGBD	OCT06	29-Oct-07	12:45	8.39	0.14	0.10
RGNBGTBD	OCT06	29-Oct-07	12:30	0.00	0.63	0.31
LFCCSGBD	OCT06	29-Oct-07	11:55	10.18	0.10	0.07
RGSBGTBD	OCT06	29-Oct-07	11:45	0.00	0.61	0.28
BDLDRAIN	OCT06	29-Oct-07	12:00	0.00	0.24	0.11
LFCCSTPK	OCT06	29-Oct-07	11:10	2.66	0.19	0.09
RGSTPKGT	OCT06	29-Oct-07	10:45	0.00	0.54	0.27
ROCKHOUS	OCT06	29-Oct-07	9:20	0.00	0.30	0.16

Units: NH_4-N – μg/L, NO_3-N – mg/L, SRP – mg/L

Table E-16 Sampling Results November 2006 (NOV06)

Site Abbrev.	Month ID	Date	Time	NH4-N	NO3-N	SRP
RGANGOST	NOV06	2-Dec-06	7:45	10.35	0.01	0.00
RGBER550	NOV06	2-Dec-06	8:10	0.00	0.01	0.01
BERNWWTP	NOV06	2-Dec-06	8:45	1392.35	1.09	0.05
RGBERLWW	NOV06	2-Dec-06	9:10	15.70	0.00	0.01
RIORWWTP	NOV06	2-Dec-06	9:30	361.50	14.66	2.58
RGRRWWTP	NOV06	2-Dec-06	9:50	0.00	0.04	0.03
RGALAMED	NOV06	2-Dec-06	10:15	0.00	0.03	0.01
RGOXBOW	NOV06	2-Dec-06	11:26	0.00	0.06	0.02
RGRIOBRV	NOV06	2-Dec-06	12:40	0.00	0.11	0.03
ABQCWWTP	NOV06	2-Dec-06	13:00	255.59	8.22	1.70
ATRSCDRN	NOV06	2-Dec-06	14:00	37.79	0.05	0.09
RGABVISL	NOV06	2-Dec-06	14:05	0.00	0.41	0.08
ABQRSDRN	NOV06	2-Dec-06	13:15	139.24	0.24	0.22
RGBELISL	NOV06	2-Dec-06	14:40	17.10	0.68	0.16
RGLLBRDG	NOV06	2-Dec-06	15:10	16.66	0.86	0.17
LOSLWWTP	NOV06	3-Dec-06	16:30	1633.79	15.78	2.92
RGLLWWTP	NOV06	3-Dec-06	13:40	21.33	1.34	0.23
RGBLENTW	NOV06	3-Dec-06	14:45	9.70	0.81	0.14
LNJDRAIN	NOV06	3-Dec-06	14:10	0.00	0.09	0.06
RGBLSANF	NOV06	3-Dec-06	13:30	0.00	0.85	0.16
RGACACIA	NOV06	3-Dec-06	12:50	8.31	0.73	0.15
RGNBGTBD	NOV06	3-Dec-06	11:45	7.92	0.60	0.15
RGSBGTBD	NOV06	3-Dec-06	10:55	8.82	0.73	0.15
BDLDRAIN	NOV06	3-Dec-06	11:10	0.00	0.02	0.03
LFCCSTPK	NOV06	3-Dec-06	10:45	0.00	0.02	0.03
RGSTPKGT	NOV06	3-Dec-06	10:20	7.21	0.61	0.12
ROCKHOUS	NOV06	3-Dec-06	8:50	6.77	0.40	0.10

Units: NH_4-N – µg/L, NO_3-N – mg/L, SRP – mg/L

Table E-17 Sampling Results December 2006 (NOV06)

Site Abbrev.	Month ID	Date	Time	NH4-N	NO3-N	SRP
RGANGOST	DEC06	10-Jan-07	9:10	0.00	0.00	0.00
RGBER550	DEC06	10-Jan-07	9:50	7.45	0.00	0.00
BERNWWTP	DEC06	10-Jan-07	10:05	2907.53	1.20	0.12
RGBERLWW	DEC06	10-Jan-07	10:45	0.00	0.01	0.00
RIORWWTP	DEC06	10-Jan-07	11:05	75.72	6.98	2.43
RGRRWWTP	DEC06	10-Jan-07	11:45	0.00	0.07	0.02
RGALAMED	DEC06	10-Jan-07	12:30	0.00	0.05	0.02
RGOXBOW	DEC06	10-Jan-07	13:05	0.00	0.06	0.03
RGRIOBRV	DEC06	10-Jan-07	14:20	0.00	0.12	0.02
ABQCWWTP	DEC06	10-Jan-07	14:05	381.25	3.84	2.79
ATRSCDRN	DEC06	10-Jan-07	15:15	0.00	0.04	0.11
RGABVISL	DEC06	10-Jan-07	15:05	43.64	0.44	0.30
RGBELISL	DEC06	10-Jan-07	15:55	100.52	0.40	0.31
RGLLBRDG	DEC06	10-Jan-07	16:10	90.34	0.56	0.35
LOSLWWTP	DEC06	10-Jan-07	16:50	684.57	20.70	3.05
RGBLENBR	DEC06	11-Jan-07	16:30	43.30	0.67	0.38
RGBLENTW	DEC06	11-Jan-07	16:15	26.73	0.53	0.10
LNJDRAIN	DEC06	11-Jan-07	15:45	0.00	0.09	0.09
RGBLSANF	DEC06	11-Jan-07	15:10	13.88	0.59	0.26
RGACACIA	DEC06	11-Jan-07	14:20	8.55	0.43	0.24
RGATNCP	DEC06	11-Jan-07	13:30	11.84	0.40	0.29
RGNBGTBD	DEC06	11-Jan-07	13:10	20.19	0.45	0.22
RGSBGTBD	DEC06	11-Jan-07	12:10	9.45	0.43	0.21
BDLDRAIN	DEC06	11-Jan-07	12:30	0.00	0.03	0.03
LFCCSTPK	DEC06	11-Jan-07	11:50	0.00	0.04	0.03
RGSTPKGT	DEC06	11-Jan-07	11:40	6.54	0.36	0.16
ROCKHOUS	DEC06	11-Jan-07	10:20	8.51	0.32	0.15

Units: NH_4-N – µg/L, NO_3-N – mg/L, SRP – mg/L

Table E-18 Sampling Results January 2007 (JAN07)

Site Abbrev.	Month ID	Date	Time	NH4-N	NO3-N	SRP
RGBER550	JAN07	4-Feb-07	12:45	0.00	0.02	0.00
RGBERLWW	JAN07	4-Feb-07	12:25	0.00	0.05	0.01
RIORWWTP	JAN07	4-Feb-07	12:05	50.43	9.37	2.81
RGRRWWTP	JAN07	4-Feb-07	11:45	0.00	0.02	0.03
RGALAMED	JAN07	4-Feb-07	11:20	0.00	0.04	0.01
RGOXBOW	JAN07	4-Feb-07	10:30	5.15	0.09	0.03
RGRIOBRV	JAN07	4-Feb-07	9:55	0.00	0.15	0.03
ABQCWWTP	JAN07	4-Feb-07	9:45	29.69	3.44	3.13
ATRSCDRN	JAN07	4-Feb-07	8:45	0.00	0.07	0.08
RGABVISL	JAN07	4-Feb-07	8:30	0.00	0.38	0.22
ABQRSDRN	JAN07	4-Feb-07	9:10	109.69	0.18	0.18
RGBELISL	JAN07	4-Feb-07	7:55	18.05	0.70	0.44
RGLLBRDG	JAN07	3-Feb-07	16:50	96.92	0.59	0.30
LOSLWWTP	JAN07	3-Feb-07	16:30	3129.16	23.55	3.43
RGLLWWTP	JAN07	3-Feb-07	15:45	17.34	0.96	0.48
RGBLENBR	JAN07	3-Feb-07	15:05	27.35	0.71	0.42
RGBLENTW	JAN07	3-Feb-07	14:45	12.41	0.56	0.34
LNJDRAIN	JAN07	3-Feb-07	14:20	0.00	0.10	0.10
RGBLSANF	JAN07	3-Feb-07	13:25	27.28	0.68	0.37
RGACACIA	JAN07	3-Feb-07	13:05	0.00	0.54	0.30
RGATNCP	JAN07	3-Feb-07	12:00	32.37	0.80	0.37
RGNBGTBD	JAN07	3-Feb-07	11:40	5.69	0.69	0.33
RGSBGTBD	JAN07	3-Feb-07	10:50	30.10	0.52	0.28
BDLDRAIN	JAN07	3-Feb-07	11:10	0.00	0.02	0.03
LFCCSTPK	JAN07	3-Feb-07	10:30	5.05	0.04	0.03
RGSTPKGT	JAN07	3-Feb-07	10:15	154.65	0.61	0.28
ROCKHOUS	JAN07	3-Feb-07	9:00	11.15	0.37	0.18

Units: NH_4-N – μg/L, NO_3-N – mg/L, SRP – mg/L

Table E-19 Sampling Results February 2007 (FEB07)

Site Abbrev.	Month ID	Date	Time	NH4-N	NO3-N	SRP
RGBUCKMN	FEB07	2-Mar-07	15:40	5.23	0.09	0.01
RGANGOST	FEB07	2-Mar-07	16:40	0.00	0.01	0.00
RGBER550	FEB07	2-Mar-07	17:40	5.82	0.02	0.00
BERNWWTP	FEB07	4-Mar-07	8:05	2740.30	0.35	0.02
RGBERLWW	FEB07	4-Mar-07	9:00	0.00	0.01	0.00
RIORWWTP	FEB07	4-Mar-07	9:10	312.10	7.31	4.34
ALMDRAIN	FEB07	4-Mar-07	10:05	0.00	0.02	0.03
RGRRWWTP	FEB07	4-Mar-07	9:40	35.19	0.06	0.03
RGALAMED	FEB07	4-Mar-07	10:35	0.00	0.04	0.01
OXBDRAIN	FEB07	4-Mar-07	11:00	0.00	0.00	0.03
RGOXBOW	FEB07	4-Mar-07	12:00	107.99	0.07	0.03
CENDRAIN	FEB07	4-Mar-07	12:20	0.00	0.04	0.01
RGRIOBRV	FEB07	4-Mar-07	13:00	0.00	0.10	0.06
ABQCWWTP	FEB07	4-Mar-07	13:30	242.64	2.37	2.71
ATRSCDRN	FEB07	4-Mar-07	14:15	0.00	0.06	0.05
RGABVISL	FEB07	4-Mar-07	14:00	0.00	0.21	0.10
ABQRSDRN	FEB07	4-Mar-07	13:45	47.60	0.16	0.18
RGBELISL	FEB07	4-Mar-07	14:30	0.00	0.47	0.28
RGLLBRDG	FEB07	3-Mar-07	17:35	0.00	0.68	0.27
LOSLWWTP	FEB07	3-Mar-07	17:25	2297.29	14.12	3.52
RGLLWWTP	FEB07	3-Mar-07	17:05	6.44	1.04	0.33
PERALTWW	FEB07	3-Mar-07	17:15	33.62	1.10	0.42
LPDR2DRN	FEB07			30.76	0.15	0.15
RGBLENBR	FEB07	3-Mar-07	16:15	11.60	0.91	0.32
RGBLENTW	FEB07	3-Mar-07	15:45	0.00	0.78	0.32
LNJDRAIN	FEB07	3-Mar-07	14:50	9.26	0.06	0.08
RGBLSANF	FEB07	3-Mar-07	14:20	6.26	0.92	0.30
UNITSVDR	FEB07	3-Mar-07	13:50	6.75	0.67	0.25
RGACACIA	FEB07	3-Mar-07	13:45	0.00	0.34	0.12
LFCCLNCP	FEB07	3-Mar-07	1300	0.00	0.03	0.05
RGATNCP	FEB07	3-Mar-07	12:55	0.00	0.73	0.23
LFCCNGBD	FEB07	3-Mar-07	12:45	0.00	0.01	0.04
RGNBGTBD	FEB07	3-Mar-07	12:30	5.18	0.75	0.20
LFCCSGBD	FEB07	3-Mar-07	11:20	0.00	0.01	0.06
RGSBGTBD	FEB07	3-Mar-07	10:55	16.21	0.55	0.16
BDLDRAIN	FEB07	3-Mar-07	11:40	0.00	0.15	0.06
LFCCSTPK	FEB07	3-Mar-07	10:30	0.00	0.11	0.04
RGSTPKGT	FEB07	3-Mar-07	10:05	9.97	0.59	0.15
ROCKHOUS	FEB07	3-Mar-07	9:10	28.71	0.41	0.12

Units: NH_4-N – μg/L, NO_3-N – mg/L, SRP – mg/L

Table E-20 Sampling Results March 2007 (MAR07)

Site Abbrev.	Month ID	Date	Time	NH4-N	NO3-N	SRP
RGANGOST	MAR07	31-Mar-07	8:30	12.90	0.10	0.02
RGBER550	MAR07	31-Mar-07	8:55	211.70	0.12	0.01
BERNWWTP	MAR07	31-Mar-07	10:09	3257.70	0.40	0.06
RGBERLWW	MAR07	31-Mar-07	10:25	0.00	0.09	0.01
RIORWWTP	MAR07	31-Mar-07	11:17	139.00	9.61	4.03
RGRRWWTP	MAR07	31-Mar-07	12:00	64.40	0.12	0.02
RGALAMED	MAR07	31-Mar-07	13:00	130.30	0.12	0.02
RGOXBOW	MAR07	31-Mar-07	13:30	42.90	0.11	0.02
RGRIOBRV	MAR07	31-Mar-07	14:00	8.40	0.11	0.01
ABQCWWTP	MAR07	31-Mar-07	14:45	590.20	6.06	2.93
ATRSCDRN	MAR07	31-Mar-07	16:20	0.00	0.05	0.08
RGABVISL	MAR07	31-Mar-07	15:20	32.60	0.62	0.19
ABQRSDRN	MAR07	31-Mar-07	15:30	31.50	0.11	0.10
RGBELISL	MAR07	31-Mar-07	18:00	19.30	0.32	0.08
RGLLBRDG	MAR07	1-Apr-07	9:00	122.20	0.55	0.12
LOSLWWTP	MAR07	1-Apr-07	9:30	135.80	17.99	4.47
RGLLWWTP	MAR07	1-Apr-07	10:45	126.60	0.57	0.13
RGBLENBR	MAR07	1-Apr-07	11:15	151.10	0.46	0.12
RGBLENTW	MAR07	1-Apr-07	12:30	92.90	0.43	0.11
RGBLSANF	MAR07	1-Apr-07	13:20	70.80	0.49	0.12
UNITSVDR	MAR07	1-Apr-07	14:10	11.50	0.26	0.09
RGACACIA	MAR07	1-Apr-07	14:00	211.60	0.52	0.09
RGATNCP	MAR07	1-Apr-07	15:00	273.20	0.38	0.08
BDLDRAIN	MAR07	1-Apr-07	15:40	49.00	0.17	0.06
LFCCSTPK	MAR07	1-Apr-07	16:00	40.60	0.12	0.05
RGSTPKGT	MAR07	1-Apr-07	16:30	114.40	0.36	0.09
ROCKHOUS	MAR07	1-Apr-07	18:36	81.20	0.34	0.08

Units: NH_4-N – µg/L, NO_3-N – mg/L, SRP – mg/L

Table E-21 Sampling Results April 2007 (APR07)

Site Abbrev.	Month ID	Date	Time	NH4-N	NO3-N	SRP
RGBUCKMN	APR07	27-Apr-07	18:25	0.00	0.01	0.01
RGANGOST	APR07	27-Apr-07	20:10	0.00	0.01	0.01
RGBER550	APR07	28-Apr-07	8:35	6.80	0.01	0.01
BERNWWTP	APR07	28-Apr-07	8:20	762.60	0.45	1.92
RGBERLWW	APR07	28-Apr-07	9:00	0.00	0.01	0.02
RIORWWTP	APR07	28-Apr-07	9:15	109.10	9.00	3.17
ALMDRAIN	APR07	28-Apr-07	10:10	13.30	0.01	0.02
RGRRWWTP	APR07	28-Apr-07	9:50	0.00	0.02	0.02
RGALAMED	APR07	28-Apr-07	10:30	0.00	0.02	0.02
LCRDRAIN	APR07	28-Apr-07	10:45	5.40	0.00	0.03
OXBDRAIN	APR07	28-Apr-07	11:05	0.00	0.00	0.01
RGLCRDR	APR07	28-Apr-07	11:20	0.00	0.03	0.02
RGOXBOW	APR07	28-Apr-07	12:30	0.00	0.04	0.02
CENDRAIN	APR07	28-Apr-07	12:50	8.20	0.00	0.01
RGRIOBRV	APR07	28-Apr-07	13:15	0.00	0.08	0.02
ABQCWWTP	APR07	28-Apr-07	13:30	519.80	3.70	2.50
ATRSCDRN	APR07	28-Apr-07	14:30	9.00	0.02	0.12
RGABVISL	APR07	28-Apr-07	14:40	7.10	0.29	0.15
ABQRSDRN	APR07	28-Apr-07	14:00	37.20	0.09	0.17
RGBELISL	APR07	28-Apr-07	14:50	5.10	0.43	0.22
RGLLBRDG	APR07	28-Apr-07	15:45	29.20	0.62	0.27
LOSLWWTP	APR07	28-Apr-07	18:17	3305.70	15.60	5.17
RGLLWWTP	APR07	28-Apr-07	17:41	0.00	0.75	0.30
RGBLENBR	APR07	28-Apr-07	17:00	0.00	0.41	0.24
RGBLENTW	APR07	29-Apr-07	16:42	0.00	0.44	0.21
RIOPUERC	APR07	29-Apr-07	13:45	91.30	1.34	0.15
LNJDRAIN	APR07	29-Apr-07	16:00	9.30	0.29	0.12
RGBLSANF	APR07	29-Apr-07	14:50	0.00	0.52	0.21
UNITSVDR	APR07	29-Apr-07	14:35	0.00	0.39	0.16
RGACACIA	APR07	29-Apr-07	14:25	6.10	0.54	0.23
RGATNCP	APR07	29-Apr-07	12:45	0.00	0.53	0.16
LFCCNGBD	APR07	29-Apr-07	12:30	6.80	0.04	0.05
RGNBGTBD	APR07	29-Apr-07	12:20	0.00	0.58	0.19
LFCCSGBD	APR07	29-Apr-07	11:40	7.00	0.04	0.05
RGSBGTBD	APR07	29-Apr-07	11:20	0.00	0.65	0.15
BDLDRAIN	APR07	29-Apr-07	11:55	11.30	0.15	0.07
LFCCSTPK	APR07	29-Apr-07	11:10	5.70	0.10	0.05
RGSTPKGT	APR07	29-Apr-07	10:55	0.00	0.50	0.14
ROCKHOUS	APR07	29-Apr-07	9:45	0.00	0.35	0.07

Units: NH_4-N – μg/L, NO_3-N – mg/L, SRP – mg/L

Table E-22 Sampling Results May 2007 (MAY07)

Site Abbrev.	Month ID	Date	Time	NH4-N	NO3-N	SRP
RGBUCKMN	MAY07	30-May-07	17:00	5.60	0.02	0.02
RGANGOST	MAY07	31-May-07	8:30	8.10	0.06	0.02
RGBER550	MAY07	31-May-07	9:10	24.00	0.05	0.01
BERNWWTP	MAY07	31-May-07	9:20	3032.10	0.25	0.56
RGBERLWW	MAY07	31-May-07	9:50	0.00	0.05	0.02
RIORWWTP	MAY07	31-May-07	10:15	130.50	8.93	2.76
RGRRWWTP	MAY07	31-May-07	11:15	0.00	0.09	0.03
RGALAMED	MAY07	31-May-07	11:45	0.00	0.01	0.01
RGOXBOW	MAY07	31-May-07	12:35	0.00	0.05	0.01
RGRIOBRV	MAY07	31-May-07	12:55	0.00	0.07	0.01
ABQCWWTP	MAY07	31-May-07	13:10	1011.90	6.43	2.50
ATRSCDRN	MAY07	31-May-07	14:30	0.00	0.01	0.06
RGABVISL	MAY07	31-May-07	14:15	0.00	0.16	0.05
ABQRSDRN	MAY07	31-May-07	13:35	8.00	0.08	0.06
RGBELISL	MAY07	31-May-07	15:15	0.00	0.24	0.05
RGLLBRDG	MAY07	31-May-07	15:50	0.00	0.28	0.07
LOSLWWTP	MAY07	31-May-07	16:18	1171.90	13.05	3.57
RGLLWWTP	MAY07	31-May-07	17:00	9.60	0.39	0.11
LPDR1DRN	MAY07	31-May-07	17:16	5.50	0.20	0.12
RGBLENBR	MAY07	31-May-07	17:50	0.00	0.34	0.09
RGBLENTW	MAY07	31-May-07	18:10	0.00	0.32	0.07
LNJDRAIN	MAY07	1-Jun-07	16:20	0.00	0.17	0.09
RGBLSANF	MAY07	1-Jun-07	15:35	0.00	0.30	0.08
UNITSVDR	MAY07	1-Jun-07	14:50	6.00	0.19	0.08
RGACACIA	MAY07	1-Jun-07	14:45	0.00	0.35	0.10
RGATNCP	MAY07	1-Jun-07	13:35	0.00	0.27	0.11
RGNBGTBD	MAY07	1-Jun-07	13:20	5.10	0.24	0.08
BDLDRAIN	MAY07	1-Jun-07	12:45	6.30	0.10	0.08
LFCCSTPK	MAY07	1-Jun-07	12:00	0.00	0.12	0.14
RGSTPKGT	MAY07	1-Jun-07	11:10	0.00	0.31	0.08
ROCKHOUS	MAY07	1-Jun-07	10:40	0.00	0.24	0.07

Units: NH_4-N – µg/L, NO_3-N – mg/L, SRP – mg/L

Table E-23 Sampling Results June 2007 (JUN07)

Site Abbrev.	Month ID	Date	Time	NH4-N	NO3-N	SRP
RGANGOST	JUN07	3-Jul-07	10:15	6.80	0.05	0.01
RGBER550	JUN07	3-Jul-07	11:15	87.20	0.04	0.01
BERNWWTP	JUN07	3-Jul-07	10:55	330.70	0.04	0.15
RGBERLWW	JUN07	3-Jul-07	11:45	0.00	0.05	0.01
RIORWWTP	JUN07	3-Jul-07	12:10	45.50	7.05	2.83
RGRRWWTP	JUN07	3-Jul-07	13:15	0.00	0.07	0.03
RGALAMED	JUN07	3-Jul-07	13:45	0.00	0.04	0.02
RGOXBOW	JUN07	3-Jul-07	14:30	0.00	0.05	0.02
RGRIOBRV	JUN07	3-Jul-07	16:15	0.00	0.10	0.02
ABQCWWTP	JUN07	3-Jul-07	15:50	177.30	6.93	1.90
ATRSCDRN	JUN07	3-Jul-07	17:05	0.00	0.05	0.12
RGABVISL	JUN07	3-Jul-07	17:30	0.00	0.49	0.13
ABQRSDRN	JUN07	3-Jul-07	15:15	24.60	0.11	0.11
RGBELISL	JUN07	4-Jul-07	8:55	0.00	1.19	0.23
RGLLWWTP	JUN07	4-Jul-07	10:35	0.00	0.81	0.25
PERALTWW	JUN07	4-Jul-07	10:50	0.00	0.57	0.19
LPDR1DRN	JUN07	4-Jul-07	11:10	0.00	0.55	0.16
RGBLENBR	JUN07	4-Jul-07	11:55	6.50	0.81	0.21
RGBLENTW	JUN07	4-Jul-07	12:20	0.00	0.73	0.17
LNJDRAIN	JUN07	4-Jul-07	12:55	5.60	0.41	0.13
RGBLSANF	JUN07	4-Jul-07	13:45	0.00	0.56	0.17
UNITSVDR	JUN07	4-Jul-07	14:45	16.60	0.18	0.08
RGACACIA	JUN07	4-Jul-07	14:25	9.30	0.12	0.08
RGATNCP	JUN07	4-Jul-07	16:25	27.20	0.03	0.05
ROCKHOUS	JUN07	4-Jul-07	17:55	8.20	0.02	0.07

Units: NH_4-N – μg/L, NO_3-N – mg/L, SRP – mg/L

Table E-24 Sampling Results July 2007 (JUL07)

Site Abbrev.	Month ID	Date	Time	NH4-N	NO3-N	SRP
RGANGOST	JUL07	10-Aug-07	13:00	.	0.01	0.04
RGBER550	JUL07	10-Aug-07	13:45	.	0.01	0.03
BERNWWTP	JUL07	10-Aug-07	13:30	.	0.04	0.60
RGBERLWW	JUL07	10-Aug-07	14:00	.	0.01	0.03
RIORWWTP	JUL07	10-Aug-07	14:15	.	7.86	3.12
RGRRWWTP	JUL07	10-Aug-07	14:45	.	0.11	0.09
RGALAMED	JUL07	10-Aug-07	15:10	.	0.07	0.07
RGOXBOW	JUL07	10-Aug-07	15:30	.	0.04	0.04
RGRIOBRV	JUL07	10-Aug-07	17:10	.	0.16	0.05
ABQCWWTP	JUL07	10-Aug-07	17:00	.	5.92	2.46
ATRSCDRN	JUL07	10-Aug-07	17:30	.	0.07	0.13
RGABVISL	JUL07	10-Aug-07	17:45	.	1.00	0.36
ABQRSDRN	JUL07	10-Aug-07	16:30	.	0.16	0.13
RGBELISL	JUL07	11-Aug-07	8:00	.	1.47	0.41
RGLLBRDG	JUL07	11-Aug-07	8:40	.	1.01	0.35
LOSLWWTP	JUL07	11-Aug-07	9:00	.	6.43	3.27
RGLLWWTP	JUL07	11-Aug-07	9:35	.	1.14	0.43
PERALTWW	JUL07	11-Aug-07	10:00	.	0.81	0.28
LPDR1DRN	JUL07	11-Aug-07	10:15	.	0.98	0.26
RGBLENBR	JUL07	11-Aug-07	10:40	.	1.23	0.34
RGBLENTW	JUL07	11-Aug-07	11:15	.	0.97	0.30
LNJDRAIN	JUL07	11-Aug-07	12:30	.	0.88	0.22

Units: NH_4-N – μg/L, NO_3-N – mg/L, SRP – mg/L

Table E-25 Sampling Results August 2007 (AUG07)

Site Abbrev.	Month ID	Date	Time	NH4-N	NO3-N	SRP
RGANGOST	AUG07	15-Sep-07	8:00	.	0.02	0.03
RGBER550	AUG07	15-Sep-07	8:15	.	0.00	0.03
BERNWWTP	AUG07	15-Sep-07	8:35	.	0.04	1.81
RGBERLWW	AUG07	15-Sep-07	9:15	.	0.02	0.05
RIORWWTP	AUG07	15-Sep-07	9:40	.	6.86	2.51
ALMDRAIN	AUG07	15-Sep-07	10:45	.	0.00	0.04
RGRRWWTP	AUG07	15-Sep-07	10:20	.	0.03	0.02
RGALAMED	AUG07	15-Sep-07	11:10	.	0.05	0.05
OXBDRAIN	AUG07	15-Sep-07	11:50	.	0.01	0.03
RGOXBOW	AUG07	15-Sep-07	12:15	.	0.11	0.10
CENDRAIN	AUG07	15-Sep-07	12:25	.	0.02	0.06
RGRIOBRV	AUG07	15-Sep-07	13:30	.	0.10	0.06
ABQCWWTP	AUG07	15-Sep-07	13:45	.	3.71	3.03
ATRSCDRN	AUG07	15-Sep-07	14:45	.	0.05	0.10
RGABVISL	AUG07	15-Sep-07	14:55	.	0.70	0.51
ABQRSDRN	AUG07	15-Sep-07	14:10	.	0.15	0.11
RGBELISL	AUG07	15-Sep-07	15:30	.	0.95	0.61
LOSLWWTP	AUG07	16-Sep-07	7:50	.	5.03	3.57
PERALTWW	AUG07	16-Sep-07	8:20	.	0.74	0.48
RGBLENBR	AUG07	16-Sep-07	9:15	.	0.05	0.22
RGBLENTW	AUG07	16-Sep-07	9:50	.	0.06	0.19
LNJDRAIN	AUG07	16-Sep-07	10:15	.	0.83	0.33
RGBLSANF	AUG07	16-Sep-07	10:55	.	0.71	0.26
UNITSVDR	AUG07	16-Sep-07	17:30	.	0.66	0.25
RGACACIA	AUG07	16-Sep-07	17:10	.	0.72	0.23
RGNBGTBD	AUG07	16-Sep-07	12:55	.	0.40	0.14
LFCCSGBD	AUG07	16-Sep-07	13:45	.	0.27	0.13
RGSBGTBD	AUG07	16-Sep-07	13:30	.	0.31	0.12
BDLDRAIN	AUG07	16-Sep-07	14:15	.	0.40	0.12
LFCCSTPK	AUG07	16-Sep-07	14:25	.	0.34	0.14
RGSTPKGT	AUG07	16-Sep-07	14:40	.	0.35	0.13
ROCKHOUS	AUG07	16-Sep-07	15:50	.	0.25	0.11
LFCATNCP	AUG07			.	0.01	0.07

Units: NH_4-N – µg/L, NO_3-N – mg/L, SRP – mg/L

Table E-26 Sampling Results September 2007 (SEP07)

Site Abbrev.	Month ID	Date	Time	NH4-N	NO3-N	SRP
RGANGOST	SEP07	21-Oct-07	16:45	.	0.01	0.01
RGBER550	SEP07	21-Oct-07	17:10	.	0.00	0.01
BERNWWTP	SEP07	21-Oct-07	17:30	.	0.04	2.54
RIORWWTP	SEP07	21-Oct-07	17:45	.	10.82	3.70
RGRRWWTP	SEP07	21-Oct-07	16:10	.	0.12	0.10
RGOXBOW	SEP07	21-Oct-07	15:35	.	0.09	0.05
RGRIOBRV	SEP07	21-Oct-07	14:10	.	0.15	0.08
ABQCWWTP	SEP07	21-Oct-07	14:30	.	2.91	1.83
ATRSCDRN	SEP07	21-Oct-07	13:20	.	0.12	0.13
ABQRSDRN	SEP07	21-Oct-07	14:50	.	0.20	0.16
RGBELISL	SEP07			.	.	.
PERALTWW	SEP07	21-Oct-07	12:35	.	0.83	0.29
RGBLENTW	SEP07	21-Oct-07	12:00	.	0.37	0.49
LNJDRAIN	SEP07	20-Oct-07		.	0.65	0.24
RGBLSANF	SEP07	20-Oct-07		.	0.77	0.31
UNITSVDR	SEP07	20-Oct-07		.	0.78	0.25
RGACACIA	SEP07	20-Oct-07		.	0.54	0.27
RGATNCP	SEP07	20-Oct-07		.	0.43	0.23
RGSBGTBD	SEP07	20-Oct-07		.	0.19	0.11
BDLDRAIN	SEP07	20-Oct-07		.	0.31	0.15
RGSTPKGT	SEP07	20-Oct-07		.	0.29	0.16
ROCKHOUS	SEP07	20-Oct-07		.	0.18	0.13

Units: NH_4-N – μg/L, NO_3-N – mg/L, SRP – mg/L

Table E-27 Sampling Results October 2007 (OCT07)

Site Abbrev.	Month ID	Date	Time	NH4-N	NO3-N	SRP
RGANGOST	OCT07	10-Nov-07	7:40	.	0.00	0.03
RGBER550	OCT07	10-Nov-07	9:15	.	0.00	0.03
BERNWWTP	OCT07	10-Nov-07	8:45	.	0.13	2.68
RGBERLWW	OCT07	10-Nov-07	9:45	.	0.01	0.03
RIORWWTP	OCT07	10-Nov-07	10:00	.	6.24	3.51
RGRRWWTP	OCT07	10-Nov-07	10:45	.	0.04	0.00
RGOXBOW	OCT07	10-Nov-07	11:15	.	0.07	0.04
RGRIOBRV	OCT07	10-Nov-07	11:45	.	0.10	0.03
ABQCWWTP	OCT07	10-Nov-07	12:10	.	4.55	4.22
ATRSCDRN	OCT07	10-Nov-07	13:45	.	0.19	0.15
ABQRSDRN	OCT07	10-Nov-07	12:40	.	0.39	0.25
RGBELISL	OCT07	10-Nov-07	14:25	.	0.83	0.47
RGLLBRDG	OCT07	10-Nov-07	14:50	.	0.96	0.50
LOSLWWTP	OCT07	10-Nov-07	15:10	.	14.87	5.40
RGLLWWTP	OCT07	10-Nov-07	16:05	.	1.11	0.54
LPDR2DRN	OCT07	10-Nov-07	18:40	.	0.00	0.00
RGBLENBR	OCT07	10-Nov-07	18:30	.	0.81	0.41
RGBLENTW	OCT07	11-Nov-07	14:40	.	0.59	0.11
LNJDRAIN	OCT07	11-Nov-07	14:00	.	0.12	0.01
RGBLSANF	OCT07	11-Nov-07	13:30	.	0.75	0.42
RGACACIA	OCT07	11-Nov-07	13:00	.	0.55	0.31
RGNBGTBD	OCT07	11-Nov-07	11:30	.	0.61	0.23
BDLDRAIN	OCT07	11-Nov-07	11:00	.	0.00	0.04
LFCCSTPK	OCT07	11-Nov-07	10:40	.	0.02	0.08
RGSTPKGT	OCT07	11-Nov-07	9:50	.	0.75	0.22
ROCKHOUS	OCT07	11-Nov-07	8:55	.	0.55	0.16

Units: NH_4-N – μg/L, NO_3-N – mg/L, SRP – mg/L

Table E-28 Sampling Results December 2007 (DEC07)

Site Abbrev.	Month ID	Date	Time	NH4-N	NO3-N	SRP
RGANGOST	DEC07	3-Jan-08	8:25	.	0.07	0.02
RGBER550	DEC07	3-Jan-08	8:55	.	0.04	0.01
BERNWWTP	DEC07	3-Jan-08	9:10	.	0.84	0.28
RGBERLWW	DEC07	3-Jan-08	9:30	.	0.02	0.00
RIORWWTP	DEC07	3-Jan-08	9:45	.	8.22	0.14
RGRRWWTP	DEC07	3-Jan-08	10:35	.	0.05	0.01
RGALAMED	DEC07	3-Jan-08	10:55	.	0.05	0.01
RGOXBOW	DEC07	3-Jan-08	11:50	.	0.09	0.01
RGRIOBRV	DEC07	3-Jan-08	12:20	.	0.17	0.03
ABQCWWTP	DEC07	3-Jan-08	12:35	.	4.43	3.31
ATRSCDRN	DEC07	3-Jan-08	13:30	.	0.03	0.06
RGABVISL	DEC07	3-Jan-08	13:45	.	0.31	0.12
ABQRSDRN	DEC07	3-Jan-08	12:55	.	0.26	0.27
RGBELISL	DEC07	3-Jan-08	14:05	.	0.55	0.26
RGLLBRDG	DEC07	3-Jan-08	14:30	.	0.64	0.32
LOSLWWTP	DEC07	3-Jan-08	15:20	.	22.70	2.76
RGLLWWTP	DEC07	3-Jan-08	15:55	.	0.69	0.30
LPDR2DRN	DEC07	3-Jan-08	16:30	.	0.17	0.20
RGBLENBR	DEC07	3-Jan-08	16:15	.	0.59	0.31
RGBLENTW	DEC07	3-Jan-08	16:55	.	0.45	0.25
LNJDRAIN	DEC07	4-Jan-08	8:30	.	0.23	0.11
RGBLSANF	DEC07	4-Jan-08	8:50	.	0.50	0.25
RGACACIA	DEC07	4-Jan-08	9:15	.	0.42	0.21
RGATNCP	DEC07	4-Jan-08	10:45	.	0.50	0.37
RGSBGTBD	DEC07	4-Jan-08	11:45	.	0.50	0.22
BDLDRAIN	DEC07	4-Jan-08	12:15	.	0.01	0.00
LFCCSTPK	DEC07	4-Jan-08	12:35	.	0.05	0.00
RGSTPKGT	DEC07	4-Jan-08	13:00	.	0.50	0.21
ROCKHOUS	DEC07	4-Jan-08	14:15	.	0.42	0.17

Units: NH_4-N – μg/L, NO_3-N – mg/L, SRP – mg/L

Table E-29 Sampling Results January 2008 (JAN08)

Site Abbrev.	Month ID	Date	Time	NH4-N	NO3-N	SRP
RGANGOST	JAN08	2-Feb-08	7:50	0.00	0.05	0.00
RGBER550	JAN08	2-Feb-08	8:20	17.56	0.02	0.00
BERNWWTP	JAN08	2-Feb-08	8:50	10714.29	0.38	0.00
RGBERLWW	JAN08	2-Feb-08	9:10	300.99	0.02	0.00
RIORWWTP	JAN08	2-Feb-08	9:30	541.59	10.32	2.83
ALMDRAIN	JAN08	2-Feb-08	10:35	0.00	0.01	0.05
RGRRWWTP	JAN08	2-Feb-08	10:15	0.00	0.04	0.02
RGALAMED	JAN08	2-Feb-08	10:45	0.00	0.05	0.01
RGOXBOW	JAN08	2-Feb-08	11:35	0.00	0.11	0.05
CENDRAIN	JAN08	2-Feb-08	11:50	0.00	0.03	0.03
RGRIOBRV	JAN08	2-Feb-08	13:10	0.00	0.17	0.02
ABQCWWTP	JAN08	2-Feb-08	13:45	703.89	3.16	3.25
ATRSCDRN	JAN08	2-Feb-08	12:40	7.86	0.05	0.07
RGABVISL	JAN08	2-Feb-08	12:15	0.00	0.45	0.24
ABQRSDRN	JAN08	2-Feb-08	14:10	92.18	0.25	0.18
RGBELISL	JAN08	2-Feb-08	15:15	9.74	0.62	0.38
RGLLBRDG	JAN08	2-Feb-08	15:55	14.49	0.79	0.41
LOSLWWTP	JAN08	2-Feb-08	16:10	3212.90	17.67	3.29
RGLLWWTP	JAN08	2-Feb-08	16:50	13.03	0.96	0.49
LPDR2DRN	JAN08	2-Feb-08	17:20	14.95	0.15	0.18
RGBLENBR	JAN08	2-Feb-08	17:15	6.11	0.77	0.48
RGBLENTW	JAN08	3-Feb-08	7:50	0.00	0.79	0.42
RIOPUERC	JAN08	3-Feb-08	8:30	22.17	0.18	0.00
LNJDRAIN	JAN08	2-Feb-08	18:00	8.62	0.15	0.06
RGBLSANF	JAN08	3-Feb-08	9:00	0.00	0.64	0.37
RGACACIA	JAN08	3-Feb-08	9:20	0.00	0.56	0.34
RGATNCP	JAN08	3-Feb-08	10:50	0.00	0.79	0.32
RGNBGTBD	JAN08	3-Feb-08	11:00	0.00	0.76	0.30
RGSBGTBD	JAN08	3-Feb-08	11:40	6.14	0.71	0.30
BDLDRAIN	JAN08	3-Feb-08	12:05	7.75	0.00	0.02
LFCCSTPK	JAN08	3-Feb-08	12:45	7.23	0.05	0.03
RGSTPKGT	JAN08	3-Feb-08	12:15	6.70	0.60	0.26
ROCKHOUS	JAN08	3-Feb-08	14:00	5.90	0.45	0.16

Units: NH_4-N – µg/L, NO_3-N – mg/L, SRP – mg/L

Appendix F: Discharge Data

Table F-1 Discharge Data September 2005 (SEP05)

Month ID	Site Abbrev.	Flowrate
SEP05	RGBUCKMN	815.75
SEP05	COCHESMC	81.7
SEP05	RGBLCOCH	626
SEP05	SMCCOCHT	64.4
SEP05	RGCOCHXS	772.1
SEP05	SANFELIP	682
SEP05	ANGUSDIV	213.9948
SEP05	BERNWWTP	0.958508
SEP05	RIORWWTP	4.900847
SEP05	SANDLKWW	0
SEP05	UPCORDRN	15.34375
SEP05	CORALSWW	41
SEP05	CENDRAIN	0
SEP05	RGRIOBRV	320.75
SEP05	ABQCWWTP	86.7299
SEP05	ATRSCDRN	23.46875
SEP05	RGABVISL	299.75
SEP05	ABQRSDRN	75
SEP05	ISLDIVER	377.0262
SEP05	LOSLWWTP	1.299672
SEP05	PERTWASW	21.95313
SEP05	LPDR1DRN	0
SEP05	BELENDRN	1.298611
SEP05	LPDR2DRN	3
SEP05	RGBLENTW	38.75
SEP05	SABDRAIN	0
SEP05	LNJDRAIN	67.48958
SEP05	SANADIVR	91.31771
SEP05	SOCOROMC	174.6319
SEP05	UNITSVDR	78.54167
SEP05	RGACACIA	57.25
SEP05	RGSTPKGT	0
SEP05	LFCCSTPK	113.25
SEP05	ROCKHOUS	113.25

Units: Discharge – cfs

Table F-2 Discharge Data October 2005 (OCT05)

Month ID	Site Abbrev.	Flowrate
OCT05	RGBUCKMN	713.3333
OCT05	COCHESMC	54.33333
OCT05	RGBLCOCH	550.6667
OCT05	SMCCOCHT	43
OCT05	RGCOCHXS	648
OCT05	SANFELIP	640.6667
OCT05	ANGUSDIV	151.5417
OCT05	BERNWWTP	0.965471
OCT05	RIORWWTP	5.255936
OCT05	SANDLKWW	0
OCT05	UPCORDRN	31.43056
OCT05	CORALSWW	41
OCT05	CENDRAIN	30.20833
OCT05	RGRIOBRV	326
OCT05	ABQCWWTP	84.67982
OCT05	ATRSCDRN	27.375
OCT05	RGABVISL	321.3333
OCT05	ABQRSDRN	104.5278
OCT05	ISLDIVER	330.1944
OCT05	LOSLWWTP	1.268727
OCT05	PERTWASW	23.03472
OCT05	LPDR1DRN	8.1875
OCT05	BELENDRN	6.8125
OCT05	LPDR2DRN	3
OCT05	SABDRAIN	0
OCT05	LNJDRAIN	86.92361
OCT05	SANADIVR	64.90972
OCT05	SOCOROMC	196.4931
OCT05	UNITSVDR	131.6042
OCT05	RGACACIA	138
OCT05	RGSTPKGT	79.33333
OCT05	LFCCSTPK	227.3333
OCT05	ROCKHOUS	306.6667

Units: Discharge – cfs

Table F-3 Discharge Data November 2005 (NOV05)

Month ID	Site Abbrev.	Flowrate
NOV05	RGBUCKMN	889
NOV05	COCHESMC	0
NOV05	RGBLCOCH	881.6667
NOV05	SMCCOCHT	0
NOV05	RGCOCHXS	881.6667
NOV05	SANFELIP	874.6667
NOV05	ANGUSDIV	11.14583
NOV05	BERNWWTP	0.966244
NOV05	RIORWWTP	5.135252
NOV05	SANDLKWW	91.79861
NOV05	UPCORDRN	20.92361
NOV05	CORALSWW	41
NOV05	CENDRAIN	89.08333
NOV05	RGRIOBRV	909.5
NOV05	ABQCWWTP	84.31623
NOV05	ATRSCDRN	28.97917
NOV05	RGABVISL	919.3333
NOV05	ABQRSDRN	52.88194
NOV05	ISLDIVER	63.125
NOV05	LOSLWWTP	1.253255
NOV05	PERTWASW	3
NOV05	LPDR1DRN	0
NOV05	BELENDRN	29.125
NOV05	LPDR2DRN	3
NOV05	SABDRAIN	4.52459
NOV05	LNJDRAIN	26.51389
NOV05	SANADIVR	0
NOV05	SOCOROMC	0
NOV05	UNITSVDR	25.07639
NOV05	RGACACIA	983.3333
NOV05	RGSTPKGT	430
NOV05	LFCCSTPK	156
NOV05	ROCKHOUS	586

Units: Discharge – cfs

Table F-4 Discharge Data December 2005 (DEC05)

Month ID	Site Abbrev.	Flowrate
DEC05	RGBUCKMN	673
DEC05	COCHESMC	0
DEC05	RGBLCOCH	690
DEC05	SMCCOCHT	0
DEC05	RGCOCHXS	690
DEC05	SANFELIP	721.5
DEC05	ANGUSDIV	5.772727
DEC05	BERNWWTP	0.949225
DEC05	RIORWWTP	5.879469
DEC05	SANDLKWW	78.15672
DEC05	UPCORDRN	14.37209
DEC05	CORALSWW	10.48837
DEC05	CENDRAIN	39.75581
DEC05	RGRIOBRV	714.5
DEC05	ABQCWWTP	83.21769
DEC05	ATRSCDRN	27.21839
DEC05	RGABVISL	695
DEC05	ABQRSDRN	43
DEC05	ISLDIVER	58.10345
DEC05	LOSLWWTP	1.291936
DEC05	PERTWASW	3
DEC05	LPDR1DRN	0
DEC05	BELENDRN	21.6
DEC05	LPDR2DRN	3
DEC05	SABDRAIN	0
DEC05	LNJDRAIN	23.97674
DEC05	SANADIVR	0
DEC05	SOCOROMC	0
DEC05	UNITSVDR	46.59302
DEC05	RGACACIA	917.5
DEC05	RGSTPKGT	499.5
DEC05	LFCCSTPK	180
DEC05	ROCKHOUS	679.5

Units: Discharge – cfs

Table F-5 Discharge Data January 2006 (JAN06)

Month ID	Site Abbrev.	Flowrate
JAN06	RGBUCKMN	600.5
JAN06	COCHESMC	0
JAN06	RGBLCOCH	548
JAN06	SMCCOCHT	0
JAN06	RGCOCHXS	548
JAN06	SANFELIP	581.5
JAN06	ANGUSDIV	1.770833
JAN06	BERNWWTP	0.810748
JAN06	RIORWWTP	5.108949
JAN06	SANDLKWW	69.57292
JAN06	UPCORDRN	12.9375
JAN06	CORALSWW	0
JAN06	CENDRAIN	21.27083
JAN06	RGRIOBRV	598
JAN06	ABQCWWTP	81.34555
JAN06	ATRSCDRN	25.28125
JAN06	RGABVISL	590.5
JAN06	ABQRSDRN	42
JAN06	ISLDIVER	58
JAN06	LOSLWWTP	1.330617
JAN06	PERTWASW	3
JAN06	LPDR1DRN	0
JAN06	BELENDRN	16.48958
JAN06	LPDR2DRN	3
JAN06	SABDRAIN	52.76042
JAN06	LNJDRAIN	21.96875
JAN06	SANADIVR	0
JAN06	SOCOROMC	0
JAN06	UNITSVDR	32.45833
JAN06	RGACACIA	605.5
JAN06	RGSTPKGT	596.5
JAN06	LFCCSTPK	179
JAN06	ROCKHOUS	775.5

Units: Discharge – cfs

Table F-6 Discharge Data February 2006 (FEB06)

Month ID	Site Abbrev.	Flowrate
FEB06	RGBUCKMN	592
FEB06	COCHESMC	0
FEB06	RGBLCOCH	610.6667
FEB06	SMCCOCHT	0
FEB06	RGCOCHXS	610.6667
FEB06	SANFELIP	606.6667
FEB06	ANGUSDIV	0
FEB06	BERNWWTP	0.80688
FEB06	RIORWWTP	4.934886
FEB06	SANDLKWW	62.10417
FEB06	UPCORDRN	11.83448
FEB06	CORALSWW	1
FEB06	CENDRAIN	34.56944
FEB06	RGRIOBRV	601.6667
FEB06	ABQCWWTP	77.98032
FEB06	ATRSCDRN	32.97222
FEB06	RGABVISL	538
FEB06	ABQRSDRN	38.3125
FEB06	ISLDIVER	25
FEB06	LOSLWWTP	1.152685
FEB06	PERTWASW	25
FEB06	LPDR1DRN	6.569444
FEB06	BELENDRN	22.36806
FEB06	SABDRAIN	34.39583
FEB06	LNJDRAIN	17.50694
FEB06	SANADIVR	0
FEB06	SOCOROMC	0
FEB06	UNITSVDR	27.73611
FEB06	RGACACIA	662
FEB06	RGSTPKGT	435.6667
FEB06	LFCCSTPK	184.3333
FEB06	ROCKHOUS	620

Units: Discharge – cfs

Table F-7 Discharge Data March 2006 (MAR06)

Month ID	Site Abbrev.	Flowrate
MAR06	RGBUCKMN	629.6667
MAR06	COCHESMC	70
MAR06	RGBLCOCH	515.3333
MAR06	SMCCOCHT	52.66667
MAR06	RGCOCHXS	638
MAR06	SANFELIP	599
MAR06	ANGUSDIV	118.2569
MAR06	BERNWWTP	0.856649
MAR06	RIORWWTP	5.161039
MAR06	SANDLKWW	0
MAR06	UPCORDRN	13.55944
MAR06	CORALSWW	6.41958
MAR06	CENDRAIN	12.99306
MAR06	RGRIOBRV	351.6667
MAR06	ABQCWWTP	80.19802
MAR06	ATRSCDRN	21.09722
MAR06	RGABVISL	345.5
MAR06	ABQRSDRN	48.56944
MAR06	ISLDIVER	294.4167
MAR06	RGBELISL	163
MAR06	LOSLWWTP	1.42345
MAR06	PERTWASW	3.763889
MAR06	LPDR1DRN	0.993056
MAR06	BELENDRN	2.208333
MAR06	RGBLENTW	140
MAR06	SABDRAIN	0.777778
MAR06	LNJDRAIN	106.9583
MAR06	SANADIVR	56.74306
MAR06	SOCOROMC	163.7014
MAR06	UNITSVDR	106.9097
MAR06	RGACACIA	175
MAR06	RGSTPKGT	53.66667
MAR06	LFCCSTPK	161.3333
MAR06	ROCKHOUS	215

Units: Discharge – cfs

Table F-8 Discharge Data April 2006 (APR06)

Month ID	Site Abbrev.	Flowrate
APR06	RGBUCKMN	1080
APR06	COCHESMC	83
APR06	RGBLCOCH	866.5
APR06	SMCCOCHT	57
APR06	RGCOCHXS	1006.5
APR06	SANFELIP	989
APR06	ANGUSDIV	173.3646
APR06	BERNWWTP	0.758916
APR06	RIORWWTP	4.251784
APR06	SANDLKWW	2.145833
APR06	UPCORDRN	20.32292
APR06	CORALSWW	5.4375
APR06	CENDRAIN	23.125
APR06	RGRIOBRV	600.5
APR06	ABQCWWTP	84.06093
APR06	ATRSCDRN	28.05208
APR06	RGABVISL	602.5
APR06	ABQRSDRN	67.96875
APR06	ISLDIVER	490.6458
APR06	RGBELISL	190.5
APR06	LOSLWWTP	1.531756
APR06	PERTWASW	5.260417
APR06	LPDR1DRN	9.802083
APR06	BELENDRN	3.5
APR06	LPDR2DRN	0
APR06	RGBLENTW	113.84
APR06	SABDRAIN	1.03125
APR06	LNJDRAIN	79.63542
APR06	SANADIVR	41.03125
APR06	SOCOROMC	161.7708
APR06	UNITSVDR	120.7188
APR06	RGACACIA	173
APR06	RGSTPKGT	56
APR06	LFCCSTPK	127
APR06	ROCKHOUS	183

Units: Discharge – cfs

Table F-9 Discharge Data May 2006 (MAY06)

Month ID	Site Abbrev.	Flowrate
MAY06	RGBUCKMN	1270
MAY06	COCHESMC	82
MAY06	RGBLCOCH	1006
MAY06	SMCCOCHT	63
MAY06	RGCOCHXS	1151
MAY06	SANFELIP	1110
MAY06	ANGUSDIV	190.3819
MAY06	BERNWWTP	0.826994
MAY06	RIORWWTP	4.352354
MAY06	SANDLKWW	0
MAY06	UPCORDRN	20
MAY06	CORALSWW	13.76389
MAY06	CENDRAIN	19.83333
MAY06	RGRIOBRV	708.6667
MAY06	ABQCWWTP	81.62405
MAY06	ATRSCDRN	40.44444
MAY06	RGABVISL	631
MAY06	ABQRSDRN	55.38194
MAY06	ISLDIVER	447.4028
MAY06	RGBELISL	268
MAY06	LOSLWWTP	1.578173
MAY06	PERTWASW	4.916667
MAY06	LPDR1DRN	0
MAY06	BELENDRN	1.041667
MAY06	LPDR2DRN	0
MAY06	RGBLENTW	117.05
MAY06	SABDRAIN	1.409722
MAY06	LNJDRAIN	50.70833
MAY06	SANADIVR	3.881944
MAY06	SOCOROMC	125.6944
MAY06	UNITSVDR	123.8472
MAY06	RGACACIA	165.6667
MAY06	RGSTPKGT	29
MAY06	LFCCSTPK	18.66667
MAY06	ROCKHOUS	47.66667

Units: Discharge – cfs

Table F-10 Discharge Data June 2006 (JUN06)

Month ID	Site Abbrev.	Flowrate
JUN06	RGBUCKMN	1295
JUN06	COCHESMC	72
JUN06	RGBLCOCH	962.5
JUN06	SMCCOCHT	48
JUN06	RGCOCHXS	1082.5
JUN06	SANFELIP	1260
JUN06	ANGUSDIV	184.76
JUN06	BERNWWTP	1.047643
JUN06	RIORWWTP	5.081858
JUN06	SANDLKWW	3.458333
JUN06	UPCORDRN	11
JUN06	CORALSWW	10.045
JUN06	CENDRAIN	41.685
JUN06	RGRIOBRV	986
JUN06	ABQCWWTP	83.01051
JUN06	ATRSCDRN	41.935
JUN06	RGABVISL	871.5
JUN06	ABQRSDRN	52.91
JUN06	ISLDIVER	430.43
JUN06	RGBELISL	484
JUN06	LOSLWWTP	1.522473
JUN06	PERTWASW	3.2
JUN06	LPDR1DRN	3.335
JUN06	BELENDRN	0
JUN06	LPDR2DRN	0
JUN06	RGBLENTW	227.4
JUN06	SABDRAIN	4.03
JUN06	LNJDRAIN	73.42
JUN06	SANADIVR	106.745
JUN06	SOCOROMC	254.883
JUN06	UNITSVDR	148.025
JUN06	RGACACIA	150
JUN06	RGSTPKGT	32
JUN06	LFCCSTPK	173.5
JUN06	ROCKHOUS	189

Units: Discharge – cfs

Table F-11 Discharge Data July 2006 (JUL06)

Month ID	Site Abbrev.	Flowrate
JUL06	RGBUCKMN	677
JUL06	COCHESMC	84
JUL06	RGBLCOCH	673
JUL06	SMCCOCHT	54
JUL06	RGCOCHXS	811
JUL06	SANFELIP	775
JUL06	ANGUSDIV	110.7684
JUL06	BERNWWTP	1.109363
JUL06	RIORWWTP	3.894375
JUL06	SANDLKWW	0
JUL06	UPCORDRN	15.78723
JUL06	CORALSWW	17.41053
JUL06	CENDRAIN	20.36842
JUL06	RGRIOBRV	442.5
JUL06	ABQCWWTP	87.07803
JUL06	ATRSCDRN	51
JUL06	RGABVISL	424
JUL06	ABQRSDRN	51.46316
JUL06	ISLDIVER	401.9789
JUL06	RGBELISL	90
JUL06	LOSLWWTP	1.856674
JUL06	PERTWASW	9.273684
JUL06	LPDR1DRN	2.389474
JUL06	BELENDRN	0
JUL06	LPDR2DRN	1.073684
JUL06	RGBLENTW	113.21
JUL06	SABDRAIN	0
JUL06	LNJDRAIN	72.30526
JUL06	SANADIVR	20.82105
JUL06	SOCOROMC	145.3158
JUL06	UNITSVDR	124.5579
JUL06	RGACACIA	320
JUL06	RGSTPKGT	707
JUL06	LFCCSTPK	300.5
JUL06	ROCKHOUS	1007.5

Units: Discharge – cfs

Table F-12 Discharge Data August 2006 (AUG06)

Month ID	Site Abbrev.	Flowrate
AUG06	RGBUCKMN	762
AUG06	COCHESMC	75
AUG06	RGBLCOCH	594.5
AUG06	SMCCOCHT	55.5
AUG06	RGCOCHXS	725
AUG06	SANFELIP	728.5
AUG06	ANGUSDIV	142.4375
AUG06	BERNWWTP	1.05521
AUG06	RIORWWTP	3.7265
AUG06	SANDLKWW	0
AUG06	UPCORDRN	15
AUG06	CORALSWW	9.666667
AUG06	CENDRAIN	36.4375
AUG06	RGRIOBRV	432
AUG06	ABQCWWTP	84.61794
AUG06	ATRSCDRN	19
AUG06	RGABVISL	409.5
AUG06	ABQRSDRN	86
AUG06	ISLDIVER	349.0842
AUG06	RGBELISL	118.5
AUG06	LOSLWWTP	1.570437
AUG06	PERTWASW	2.052083
AUG06	LPDR1DRN	16.15789
AUG06	BELENDRN	1.3125
AUG06	LPDR2DRN	0
AUG06	RGBLENTW	139.36
AUG06	SABDRAIN	1.848485
AUG06	LNJDRAIN	134.8333
AUG06	SANADIVR	15.59375
AUG06	SOCOROMC	157.1354
AUG06	UNITSVDR	141.6563
AUG06	RGACACIA	363
AUG06	RGSTPKGT	381.5
AUG06	LFCCSTPK	334.5
AUG06	ROCKHOUS	716

Units: Discharge – cfs

Table F-13 Discharge Data September 2006 (SEP06)

Month ID	Site Abbrev.	Flowrate
SEP06	RGBUCKMN	750
SEP06	COCHESMC	72
SEP06	RGBLCOCH	606.6667
SEP06	SMCCOCHT	55.66667
SEP06	RGCOCHXS	734.3333
SEP06	SANFELIP	753
SEP06	ANGUSDIV	139.5694
SEP06	BERNWWTP	1.022718
SEP06	RIORWWTP	4.518681
SEP06	SANDLKWW	0
SEP06	UPCORDRN	24
SEP06	CORALSWW	10.57639
SEP06	CENDRAIN	2.180556
SEP06	RGRIOBRV	437
SEP06	ABQCWWTP	85.8093
SEP06	ATRSCDRN	25.98611
SEP06	RGABVISL	430.3333
SEP06	ABQRSDRN	71.625
SEP06	ISLDIVER	423.9236
SEP06	RGBELISL	72
SEP06	LOSLWWTP	1.701952
SEP06	PERTWASW	1.791667
SEP06	LPDR1DRN	1.855172
SEP06	BELENDRN	0.34375
SEP06	LPDR2DRN	10.20139
SEP06	RGBLENTW	28.44
SEP06	SABDRAIN	0.25
SEP06	LNJDRAIN	94.09722
SEP06	SANADIVR	39.70833
SEP06	SOCOROMC	170.4479
SEP06	UNITSVDR	126.8958
SEP06	RGACACIA	181.3333
SEP06	RGSTPKGT	24.33333
SEP06	LFCCSTPK	113.3333
SEP06	ROCKHOUS	137.6667

Units: Discharge – cfs

Table F-14 Discharge Data October 2006 (OCT06)

Month ID	Site Abbrev.	Flowrate
OCT06	RGBUCKMN	877.6667
OCT06	COCHESMC	73
OCT06	RGBLCOCH	913
OCT06	SMCCOCHT	49.33333
OCT06	RGCOCHXS	1035.333
OCT06	SANFELIP	1120
OCT06	ANGUSDIV	86.75887
OCT06	BERNWWTP	1.070682
OCT06	RIORWWTP	6.270918
OCT06	SANDLKWW	0
OCT06	UPCORDRN	0
OCT06	CORALSWW	5.690141
OCT06	CENDRAIN	71.80282
OCT06	RGRIOBRV	873
OCT06	ABQCWWTP	87.19407
OCT06	ATRSCDRN	42.11972
OCT06	RGABVISL	835.3333
OCT06	ABQRSDRN	87.43662
OCT06	ISLDIVER	373.1761
OCT06	RGBELISL	575
OCT06	LOSLWWTP	1.748368
OCT06	PERTWASW	80.25352
OCT06	LPDR1DRN	43.21831
OCT06	BELENDRN	3.659574
OCT06	LPDR2DRN	3.802817
OCT06	RGBLENTW	423.23
OCT06	SABDRAIN	0.577465
OCT06	LNJDRAIN	114.7887
OCT06	SANADIVR	10.89437
OCT06	SOCOROMC	118.3617
OCT06	UNITSVDR	103.4085
OCT06	RGACACIA	1030
OCT06	RGSTPKGT	582.6667
OCT06	LFCCSTPK	262.6667
OCT06	ROCKHOUS	845.3333

Units: Discharge – cfs

Table F-15 Discharge Data November 2006 (NOV06)

Month ID	Site Abbrev.	Flowrate
NOV06	RGBUCKMN	817
NOV06	COCHESMC	0
NOV06	RGBLCOCH	782.5
NOV06	SMCCOCHT	0.31
NOV06	RGCOCHXS	782.81
NOV06	SANFELIP	867.5
NOV06	ANGUSDIV	0
NOV06	BERNWWTP	1.026586
NOV06	RIORWWTP	6.570307
NOV06	SANDLKWW	60.21875
NOV06	UPCORDRN	0
NOV06	CORALSWW	0
NOV06	CENDRAIN	133.8958
NOV06	RGRIOBRV	859.5
NOV06	ABQCWWTP	83.85979
NOV06	ATRSCDRN	44.51042
NOV06	RGABVISL	827.5
NOV06	ABQRSDRN	49.07292
NOV06	ISLDIVER	0
NOV06	RGBELISL	873.5
NOV06	LOSLWWTP	1.462131
NOV06	PERTWASW	0
NOV06	LPDR1DRN	0
NOV06	BELENDRN	10.89583
NOV06	RGBLENTW	1015.2
NOV06	SABDRAIN	0
NOV06	LNJDRAIN	40.41667
NOV06	SANADIVR	0
NOV06	SOCOROMC	0
NOV06	UNITSVDR	12.10417
NOV06	RGACACIA	1260
NOV06	RGSTPKGT	933.5
NOV06	LFCCSTPK	189
NOV06	ROCKHOUS	1122.5

Units: Discharge – cfs

Table F-16 Discharge Data December 2006 (DEC06)

Month ID	Site Abbrev.	Flowrate
DEC06	RGBUCKMN	712
DEC06	COCHESMC	0
DEC06	RGBLCOCH	564
DEC06	SMCCOCHT	0
DEC06	RGCOCHXS	564
DEC06	SANFELIP	586
DEC06	ANGUSDIV	0
DEC06	BERNWWTP	1.082286
DEC06	RIORWWTP	5.952189
DEC06	UPCORDRN	0
DEC06	CORALSWW	0
DEC06	CENDRAIN	96
DEC06	RGRIOBRV	612
DEC06	ABQCWWTP	80.51778
DEC06	ATRSCDRN	28.5
DEC06	RGABVISL	380
DEC06	ABQRSDRN	43
DEC06	ISLDIVER	0
DEC06	RGBELISL	802
DEC06	LOSLWWTP	1.632326
DEC06	PERTWASW	0
DEC06	LPDR1DRN	2
DEC06	BELENDRN	6.642105
DEC06	RGBLENTW	719.71
DEC06	LNJDRAIN	54.5
DEC06	SANADIVR	0
DEC06	SOCOROMC	0
DEC06	UNITSVDR	18.45
DEC06	RGACACIA	1045
DEC06	RGSTPKGT	666
DEC06	LFCCSTPK	189.5
DEC06	ROCKHOUS	855.5

Units: Discharge – cfs

Table F-17 Discharge Data January 2007 (JAN07)

Month ID	Site Abbrev.	Flowrate
JAN07	RGBUCKMN	650
JAN07	COCHESMC	0
JAN07	RGBLCOCH	723.5
JAN07	SMCCOCHT	0
JAN07	RGCOCHXS	723.5
JAN07	SANFELIP	737
JAN07	ANGUSDIV	0
JAN07	BERNWWTP	1.090023
JAN07	RIORWWTP	5.129063
JAN07	SANDLKWW	106.8854
JAN07	UPCORDRN	0
JAN07	CORALSWW	0
JAN07	CENDRAIN	87
JAN07	RGRIOBRV	742.5
JAN07	ABQCWWTP	82.35125
JAN07	ATRSCDRN	34.5
JAN07	RGABVISL	765.5
JAN07	ABQRSDRN	40
JAN07	ISLDIVER	0
JAN07	LOSLWWTP	1.701952
JAN07	PERTWASW	0
JAN07	LPDR1DRN	2
JAN07	BELENDRN	4.5
JAN07	RGBLENTW	793.51
JAN07	LNJDRAIN	49.5
JAN07	SANADIVR	0
JAN07	SOCOROMC	0
JAN07	UNITSVDR	2
JAN07	RGACACIA	942
JAN07	RGSTPKGT	590.5
JAN07	LFCCSTPK	186
JAN07	ROCKHOUS	776.5

Units: Discharge – cfs

Table F-18 Discharge Data February 2007 (FEB07)

Month ID	Site Abbrev.	Flowrate
FEB07	RGBUCKMN	779
FEB07	COCHESMC	0
FEB07	RGBLCOCH	804
FEB07	SMCCOCHT	0
FEB07	RGCOCHXS	804
FEB07	SANFELIP	813
FEB07	ANGUSDIV	96
FEB07	BERNWWTP	1.099306
FEB07	RIORWWTP	5.195594
FEB07	SANDLKWW	124.7222
FEB07	UPCORDRN	0
FEB07	CORALSWW	0
FEB07	CENDRAIN	66
FEB07	RGRIOBRV	769
FEB07	ABQCWWTP	82.1269
FEB07	ATRSCDRN	60
FEB07	RGABVISL	718
FEB07	ABQRSDRN	40
FEB07	ISLDIVER	222.6667
FEB07	RGBELISL	603
FEB07	LOSLWWTP	1.640062
FEB07	PERTWASW	75.33333
FEB07	LPDR1DRN	2
FEB07	BELENDRN	0
FEB07	LPDR2DRN	123.75
FEB07	RGBLENTW	741.02
FEB07	SABDRAIN	28.9
FEB07	LNJDRAIN	44
FEB07	SANADIVR	0
FEB07	SOCOROMC	80.24306
FEB07	UNITSVDR	0
FEB07	RGACACIA	846.5
FEB07	RGSTPKGT	421
FEB07	LFCCSTPK	214
FEB07	ROCKHOUS	635

Units: Discharge – cfs

Table F-19 Discharge Data March 2007 (MAR07)

Month ID	Site Abbrev.	Flowrate
MAR07	RGBUCKMN	2005
MAR07	COCHESMC	40
MAR07	RGBLCOCH	1870
MAR07	SMCCOCHT	35
MAR07	RGCOCHXS	1945
MAR07	SANFELIP	1965
MAR07	ANGUSDIV	83.5
MAR07	BERNWWTP	1.079966
MAR07	RIORWWTP	5.042418
MAR07	SANDLKWW	0
MAR07	UPCORDRN	34.5
MAR07	CORALSWW	1.25
MAR07	CENDRAIN	16
MAR07	RGRIOBRV	1830
MAR07	ABQCWWTP	81.17535
MAR07	ATRSCDRN	114.5
MAR07	RGABVISL	2145
MAR07	ABQRSDRN	105.5
MAR07	ISLDIVER	377
MAR07	RGBELISL	1340
MAR07	LOSLWWTP	1.562701
MAR07	PERTWASW	11
MAR07	LPDR1DRN	28.5
MAR07	BELENDRN	5.6875
MAR07	LPDR2DRN	10
MAR07	RGBLENTW	1660.57
MAR07	LNJDRAIN	187.5
MAR07	SANADIVR	0
MAR07	SOCOROMC	183.4688
MAR07	UNITSVDR	0
MAR07	RGACACIA	1130
MAR07	RGSTPKGT	1145
MAR07	LFCCSTPK	312
MAR07	ROCKHOUS	1457

Units: Discharge – cfs

Table F-20 Discharge Data April 2007 (APR07)

Month ID	Site Abbrev.	Flowrate
APR07	RGBUCKMN	1180
APR07	COCHESMC	79
APR07	RGBLCOCH	898
APR07	SMCCOCHT	54.5
APR07	RGCOCHXS	1031.5
APR07	SANFELIP	1055
APR07	ANGUSDIV	166.3333
APR07	BERNWWTP	1.127156
APR07	RIORWWTP	4.647875
APR07	SANDLKWW	0
APR07	UPCORDRN	23.33333
APR07	CORALSWW	5.666667
APR07	CENDRAIN	21.56667
APR07	RGRIOBRV	910
APR07	ABQCWWTP	82.95466
APR07	ATRSCDRN	49
APR07	RGABVISL	791
APR07	ABQRSDRN	83.33333
APR07	ISLDIVER	461.3333
APR07	RGBELISL	394.5
APR07	LOSLWWTP	1.593646
APR07	PERTWASW	15.33333
APR07	LPDR1DRN	13
APR07	BELENDRN	0.727273
APR07	LPDR2DRN	11
APR07	RGBLENTW	337.81
APR07	LNJDRAIN	120.6667
APR07	SANADIVR	71.66667
APR07	SOCOROMC	215.9583
APR07	UNITSVDR	144.5667
APR07	RGACACIA	407.5
APR07	RGSTPKGT	561.5
APR07	LFCCSTPK	249.5
APR07	ROCKHOUS	811

Units: Discharge – cfs

Table F-21 Discharge Data May 2007 (MAY07)

Month ID	Site Abbrev.	Flowrate
MAY07	RGBUCKMN	2336.667
MAY07	COCHESMC	84.33333
MAY07	RGBLCOCH	2326.667
MAY07	SMCCOCHT	49
MAY07	RGCOCHXS	2460
MAY07	SANFELIP	2653.333
MAY07	ANGUSDIV	181.6667
MAY07	BERNWWTP	1.151138
MAY07	RIORWWTP	4.446735
MAY07	SANDLKWW	0
MAY07	UPCORDRN	37.66667
MAY07	CORALSWW	5.333333
MAY07	CENDRAIN	38
MAY07	RGRIOBRV	2483.333
MAY07	ABQCWWTP	81.86387
MAY07	ATRSCDRN	149.3333
MAY07	RGABVISL	2673.333
MAY07	ABQRSDRN	102.3333
MAY07	ISLDIVER	378.3333
MAY07	RGBELISL	1700
MAY07	LOSLWWTP	1.570437
MAY07	PERTWASW	25.33333
MAY07	LPDR1DRN	27
MAY07	BELENDRN	9.1875
MAY07	LPDR2DRN	12
MAY07	RGBLENTW	2267.61
MAY07	LNJDRAIN	141.3333
MAY07	SANADIVR	26.66667
MAY07	SOCOROMC	223.2778
MAY07	UNITSVDR	196.5667
MAY07	RGACACIA	1836.667
MAY07	RGSTPKGT	1740
MAY07	LFCCSTPK	319.6667
MAY07	ROCKHOUS	2059.667

Units: Discharge – cfs

Table F-22 Discharge Data June 2007 (JUN07)

Month ID	Site Abbrev.	Flowrate
JUN07	RGBUCKMN	1210
JUN07	COCHESMC	82
JUN07	RGBLCOCH	919
JUN07	SMCCOCHT	60
JUN07	RGCOCHXS	1061
JUN07	SANFELIP	947
JUN07	ANGUSDIV	207.5
JUN07	BERNWWTP	1.19214
JUN07	RIORWWTP	4.128006
JUN07	SANDLKWW	3.03125
JUN07	UPCORDRN	16.5
JUN07	CORALSWW	8
JUN07	CENDRAIN	13.5
JUN07	RGRIOBRV	588.5
JUN07	ABQCWWTP	83.00108
JUN07	ATRSCDRN	47
JUN07	ABQRSDRN	81.5
JUN07	ISLDIVER	471
JUN07	RGBELISL	140.5
JUN07	LOSLWWTP	1.554965
JUN07	PERTWASW	30.5
JUN07	LPDR1DRN	29.5
JUN07	BELENDRN	0.072917
JUN07	LPDR2DRN	3.5
JUN07	RGBLENTW	168.44
JUN07	LNJDRAIN	84.5
JUN07	SANADIVR	177
JUN07	SOCOROMC	253.8125
JUN07	UNITSVDR	76.8
JUN07	RGACACIA	86
JUN07	RGSTPKGT	20
JUN07	LFCCSTPK	190
JUN07	ROCKHOUS	210

Units: Discharge – cfs

Table F-23 Discharge Data July 2007 (JUL07)

Month ID	Site Abbrev.	Flowrate
JUL07	RGBUCKMN	828
JUL07	COCHESMC	85.5
JUL07	RGBLCOCH	658.5
JUL07	SMCCOCHT	59.5
JUL07	RGCOCHXS	803.5
JUL07	SANFELIP	652.5
JUL07	ANGUSDIV	172
JUL07	BERNWWTP	1.157327
JUL07	RIORWWTP	4.48851
JUL07	SANDLKWW	0
JUL07	UPCORDRN	17.5
JUL07	CORALSWW	7.5
JUL07	CENDRAIN	21
JUL07	RGRIOBRV	439
JUL07	ABQCWWTP	86.04912
JUL07	ATRSCDRN	66.5
JUL07	RGABVISL	480
JUL07	ABQRSDRN	104
JUL07	ISLDIVER	405.5
JUL07	RGBELISL	67.5
JUL07	LOSLWWTP	1.578173
JUL07	PERTWASW	50.5
JUL07	LPDR1DRN	11
JUL07	BELENDRN	0
JUL07	LPDR2DRN	2
JUL07	RGBLENTW	75
JUL07	LNJDRAIN	107
JUL07	SANADIVR	11.5
JUL07	SOCOROMC	176.8452
JUL07	UNITSVDR	165.45
JUL07	RGACACIA	208.5
JUL07	RGSTPKGT	200
JUL07	LFCCSTPK	214
JUL07	ROCKHOUS	414

Units: Discharge – cfs

Table F-24 Discharge Data August 2007 (AUG07)

Month ID	Site Abbrev.	Flowrate
AUG07	RGBUCKMN	720
AUG07	COCHESMC	87
AUG07	RGBLCOCH	607
AUG07	SMCCOCHT	59
AUG07	RGCOCHXS	753
AUG07	SANFELIP	731
AUG07	ANGUSDIV	182.7083
AUG07	BERNWWTP	1.215348
AUG07	RIORWWTP	4.846694
AUG07	SANDLKWW	0.052083
AUG07	UPCORDRN	21.60417
AUG07	CORALSWW	23.79167
AUG07	CENDRAIN	22.13542
AUG07	RGRIOBRV	363.5
AUG07	ABQCWWTP	85.48438
AUG07	ATRSCDRN	74.10417
AUG07	RGABVISL	399
AUG07	ABQRSDRN	101.8542
AUG07	ISLDIVER	423.0313
AUG07	RGBELISL	24.5
AUG07	LOSLWWTP	1.585909
AUG07	PERTWASW	7.666667
AUG07	LPDR1DRN	0
AUG07	BELENDRN	5.520833
AUG07	LPDR2DRN	0
AUG07	RGBLENTW	24
AUG07	SABDRAIN	2
AUG07	LNJDRAIN	106.7292
AUG07	SANADIVR	79.92708
AUG07	SOCOROMC	202.2813
AUG07	UNITSVDR	122.3438
AUG07	RGACACIA	35.5
AUG07	RGSTPKGT	65.5
AUG07	LFCCSTPK	115.5
AUG07	ROCKHOUS	181

Units: Discharge – cfs

Table F-25 Discharge Data September 2007 (SEP07)

Month ID	Site Abbrev.	Flowrate
SEP07	RGBUCKMN	505
SEP07	COCHESMC	72
SEP07	RGBLCOCH	364.5
SEP07	SMCCOCHT	45
SEP07	RGCOCHXS	481.5
SEP07	SANFELIP	519
SEP07	ANGUSDIV	145.49
SEP07	BERNWWTP	1.257123
SEP07	RIORWWTP	5.006832
SEP07	SANDLKWW	0
SEP07	UPCORDRN	21.25
SEP07	CORALSWW	0.605
SEP07	CENDRAIN	41.085
SEP07	RGRIOBRV	282
SEP07	ABQCWWTP	82.77673
SEP07	ATRSCDRN	35.98
SEP07	RGABVISL	475
SEP07	ABQRSDRN	96.66
SEP07	ISLDIVER	363.02
SEP07	RGBELISL	44
SEP07	LOSLWWTP	1.601382
SEP07	PERTWASW	22.76
SEP07	LPDR1DRN	1.575
SEP07	BELENDRN	0.6875
SEP07	LPDR2DRN	0
SEP07	RGBLENTW	37.89
SEP07	SABDRAIN	2
SEP07	LNJDRAIN	114.565
SEP07	SANADIVR	19.89
SEP07	SOCOROMC	148.3854
SEP07	UNITSVDR	128.59
SEP07	RGACACIA	188.5
SEP07	RGSTPKGT	65
SEP07	LFCCSTPK	109.5
SEP07	ROCKHOUS	174.5

Units: Discharge – cfs

Table F-26 Discharge Data October 2007 (OCT07)

Month ID	Site Abbrev.	Flowrate
OCT07	RGBUCKMN	687
OCT07	COCHESMC	0
OCT07	RGBLCOCH	586.5
OCT07	SMCCOCHT	45
OCT07	RGCOCHXS	631.5
OCT07	SANFELIP	746.5
OCT07	ANGUSDIV	16.15
OCT07	BERNWWTP	1.255576
OCT07	RIORWWTP	5.151498
OCT07	SANDLKWW	87.36207
OCT07	UPCORDRN	17.5
OCT07	CORALSWW	0
OCT07	CENDRAIN	76
OCT07	RGRIOBRV	564.5
OCT07	ABQCWWTP	81.69367
OCT07	ATRSCDRN	34
OCT07	RGABVISL	592.5
OCT07	ABQRSDRN	57.5
OCT07	ISLDIVER	25
OCT07	RGBELISL	516
OCT07	LOSLWWTP	1.632326
OCT07	PERTWASW	0
OCT07	LPDR1DRN	0
OCT07	BELENDRN	47.71429
OCT07	LPDR2DRN	40
OCT07	RGBLENTW	690.45
OCT07	SABDRAIN	2
OCT07	LNJDRAIN	68
OCT07	SANADIVR	0
OCT07	SOCOROMC	0
OCT07	UNITSVDR	3
OCT07	RGACACIA	815
OCT07	RGSTPKGT	297
OCT07	LFCCSTPK	106.5
OCT07	ROCKHOUS	445

Units: Discharge – cfs

Table F-27 Discharge Data December 2007 (DEC07)

Month ID	Site Abbrev.	Flowrate
DEC07	RGBUCKMN	635.75
DEC07	COCHESMC	0
DEC07	RGBLCOCH	755
DEC07	SMCCOCHT	0
DEC07	RGCOCHXS	755
DEC07	SANFELIP	689
DEC07	ANGUSDIV	0
DEC07	BERNWWTP	1
DEC07	RIORWWTP	7
DEC07	SANDLKWW	63.70526
DEC07	SANDLKWW	82.01053
DEC07	UPCORDRN	0
DEC07	CORALSWW	0
DEC07	CENDRAIN	59.25
DEC07	RGRIOBRV	764
DEC07	ABQCWWTP	83.23
DEC07	ATRSCDRN	46.9
DEC07	RGABVISL	624
DEC07	ABQRSDRN	49.8
DEC07	ISLDIVER	0
DEC07	RGBELISL	812
DEC07	LOSLWWTP	1.5
DEC07	PERTWASW	0
DEC07	LPDR1DRN	0
DEC07	BELENDRN	7.663158
DEC07	LPDR2DRN	50
DEC07	RGBLENTW	828.25
DEC07	SABDRAIN	2
DEC07	LNJDRAIN	41
DEC07	SANADIVR	0
DEC07	SOCOROMC	0
DEC07	UNITSVDR	0
DEC07	RGACACIA	754
DEC07	RGSTPKGT	598.5
DEC07	LFCCSTPK	183
DEC07	ROCKHOUS	781.5

Units: Discharge – cfs

Table F-28 Discharge Data January 2008 (JAN08)

Month ID	Site Abbrev.	Flowrate
JAN08	RGBUCKMN	694.5
JAN08	COCHESMC	0
JAN08	RGBLCOCH	651.2
JAN08	SMCCOCHT	0
JAN08	RGCOCHXS	651.2
JAN08	SANFELIP	619
JAN08	ANGUSDIV	0
JAN08	BERNWWTP	1.2545
JAN08	RIORWWTP	7
JAN08	SANDLKWW	70.27907
JAN08	UPCORDRN	12
JAN08	CORALSWW	0
JAN08	CENDRAIN	55
JAN08	RGRIOBRV	704
JAN08	ABQCWWTP	79.837
JAN08	ATRSCDRN	44.5
JAN08	RGABVISL	642
JAN08	ABQRSDRN	48.25
JAN08	ISLDIVER	0
JAN08	RGBELISL	800
JAN08	LOSLWWTP	1.547229
JAN08	PERTWASW	0
JAN08	LPDR1DRN	0
JAN08	BELENDRN	7.014085
JAN08	LPDR2DRN	50
JAN08	RGBLENTW	666.6
JAN08	SABDRAIN	48.5
JAN08	LNJDRAIN	36.65
JAN08	SANADIVR	0
JAN08	SOCOROMC	0
JAN08	UNITSVDR	0
JAN08	RGACACIA	800.5
JAN08	RGESCOND	727.3
JAN08	RGSANANT	652.7
JAN08	RGSTPKGT	609
JAN08	LFCCSTPK	173.5
JAN08	ROCKHOUS	783

Units: Discharge – cfs

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